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Motive Power Department:

Rebuilt 4-6-2 Compound Locomotives Show Economies 527
Scale Prevention in Closed Feedwater Heaters 537

Car Department:

D. & H. Builds 100 Box Cars 525
Make Your Car Foremen Your Assistants 534

General:

Dunn and Lee Elected Leaders of Simmons-Boardman Companies 539

Editorials:

Economies in Car Washing 540
Broad Shoulders and Thick Skins 540
Heat Wastes in Power Plants 540
Shop Use of Skids 541
Power Trucks at Shops and Enginehouses 541
New Books 542
Expensive Economies 542

The Reader's Page:

It Pays To Study Chill Worn Wheels 543
Oil or Water? 543
Hard Times Have Their Opportunities 543
Are You Overlooking This Point? 543
Disagrees About Side Bearings 543

Car Foremen and Inspectors:

A Machine for Cleaning Carpets 544
Draft-Key Retainers Held by Rivets 546
Device for Wearing-In Journal Bearings 546
Arbitration Decisions 546

Handy Stripping Bench in Triple Valve Shop ... 548
Device for Forming Back Rolls in Journal Boxes 548
Floor Furnace and Nozzle Valve 549

Shop and Enginehouse:

Machine Placement and Production 550
A Cab Safety Platform 551
Attachment for Cutting Oil Grooves in Bushings 552
Mechanical Lubricator Filler 553
Portable Pipe Racks 553
Cooling Trough for the Pipe Shop 554
Rack for Testing Main Reservoirs 554
Front-End Storage Rack 554
Keyway Miller 555

New Devices:

York Air-Conditioning Equipment for Passenger Cars 556
Wright Electric Trolley Hoists 557
Thompson Hydraulic Surface Grinder 558
Self-Opening Die Heads 558
Air Tool for Tapping and Re-Tapping 558
Loadmaster Equipped with Electro Magnet 559
DeVilbiss Portable Spraying Outfit 559
Texrope V-Belt Axle-Generator Drive 559
Protective Paint for Pipe Lines 560
Turret Attachments for Cincinnati Lathes 560
Whitney Toggle-Lever Foot Press 560
Steam Trap with Thermostatic Control 560

Clubs and Associations 561

News 563

Buyers Index ..... 44 (Adv. Sec.)

Index to Advertisers ..... 54 (Adv. Sec.)

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OXWELDING

means faster repairs

A PROMINENT labor leader, in a recent article in The New York Times, says: "Repairs which before the introduction of the oxy-acetylene welding process took eight men three weeks for one locomotive can now be done in from three to seven hours with a force of not more than four men."

Oxy-acetylene welding speeds repair work and reduces its cost because it makes the ordering and stocking of replacement parts unnecessary. By fusing the damaged members into a permanently solid unit, it produces a joint that is as strong as, or stronger than, the metal itself. It can be used on iron, steel, aluminum, copper, lead, brass, bronze, and many ferrous and non-ferrous alloys.

Oxy-acetylene cutting provides a quick, easy way to cut steel and iron to shape, to demolish steel and iron structures, and to increase the value of scrap by cutting it into charging box sizes.

For nineteen years, The Oxweld Railroad Service Company has contributed to the efficiency of American railroads by providing them with the best methods and materials for oxy-acetylene welding and cutting. Year after year, the majority of Class I railroads are finding this service of increasing value.

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November - 1931

D. & H. Builds 100 Box Cars

Constructed at Green Island Shops according to plan known as the "Point System"—Eight-station spot system arranged to produce one complete car each day — Single-sheathed, steel-frame box cars of 80,000 lb. capacity

THE Delaware & Hudson recently placed in service 100 single-sheathed steel-frame box cars having a capacity of 80,000 lb. These cars are 40 ft. long and have a load limit of 91,400 lb. and a tare weight of 44,600 lb. These new cars replaced the same number of obsolete units which were retired.

The new cars, which were built at the Green Island (N. Y.) shops, are being used largely for the transportation of lading such as paper and paper products, flour, feed, grain, etc. They are also intended for furniture, refrigerators, ground slate, cement, lime and similar commodities.

The construction of the cars was carried out according to a plan which has been developed by the car department and known as the "point system." The actual work was handled through the shops of an eight station spot system, the production schedule of which was arranged for one complete car each eight-hour day. The assembling and constructing operations, exclusive of the air-brake work, were performed by a force of 20 car mechanics, which included 13-steel car and 7 wood-car men.

Single-sheathed 80,000-lb. box car built by the Delaware & Hudson

The Point System

Under the point system an equal number of cars of similar type and purpose are retired as a new building program progresses. Thus, the retirement of obsolete units is carried out systematically, insuring the selection of cars which have passed the stage where they can be repaired economically.

The functioning of the point system keeps in effect a definite method for determining the disposition of freight cars in need of extensive repairs. For example, the major items of repair, except trucks and draft gears, common to cars of a certain class and series are listed, and the cost of labor and material for repairing the various parts is determined.

The cost, thus estimated and determined, is reduced to points, each point representing a definite amount of money. Each major repair item is assigned a certain number of points. A maximum number of points is then established, which figure determines the disposition of each car of the series.

A statement showing the condition of each car scheduled for demolition is submitted by the division car foreman to the master car builder. This statement includes each major item of repair, shows the condition of the part and whether or not it should be renewed. Authority for disposition is only sought when the extent of reconditioning a car indicates that the authorized

limit of points will be exceeded when repairs are made.

Once a number of points for repairing freight cars of a particular series is established, the allowable limit of points remains constant and is not susceptible to revision because of fluctuating material prices and labor rates, as is the case when monetary limits are employed.

Construction of the Cars

In the steel construction of the new box cars are 225 fabricated steel parts of various shapes, the assembling of which involved the driving of 1,934 rivets. The shapes were fabricated at the steel mills in accordance with D. & H. drawings and specifications.

The center sills are made up of two 12-in., 40.3 lb., A.R.A. sections, with one ¼-in. by 20-in. top cover plate, while the side sills consist of 7-in., 18.8-lb., ARA sections. The body bolsters are composed of ⅜-in. pressed diaphragms with ⅜-in. by 22-in. top., and ½-in. by 18-in. bottom cover plates, while the cross-bearers have $\frac{5}{16}$-

Interior of one of the new D. & H. box cars

in. diaphragms and ⅜-in. by 8-in. top, and ⅜-in. by 6-in. bottom cover plates with a 3-in. by 3-in. by ¼-in. stiffener angle at the top cover plate. Cross-tie webs consist of ¼-in. steel diaphragms.

The wood construction (siding, decking, posts, etc.) required the use of 991 bolts. Practically all of these bolts have specially formed countersunk heads, thus sealing the holes and making them water tight. The absence of nails and the use of this type of bolt head, which is drawn flush with the wood, minimizes the possibility of damage to lading often occasioned by protruding nails, bolts, etc.

The trucks were designed and built by the National Malleable & Steel Castings Company and are known as the type B. The major objectives sought in this design are greater flexibility, better riding qualities, and increased clearance above the track.

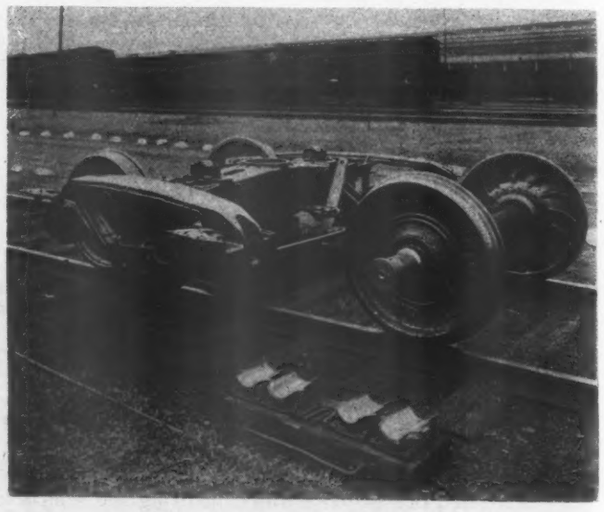
This truck is a departure from the conventional A.R.A. type in that the spring plan is entirely eliminated. The spring arrangement consists of A.R.A. type E truck springs with two in the bolster end and two underneath in the side frame. The brake-hanger brackets and journal boxes are cast integral with the side

Youngstown steel door with Camel fixtures

frame. Because of the quick-wheel change feature, it is possible for two men to change a pair of wheels in less than one-half hour. All the brake rigging is above the beams, consequently there is less liability of a brake beam pulling off in case of a derailment or accident. Maintenance is further reduced by the absence of bolts commonly used in the conventional design of truck.

The draft attachments used are a complete assembly of the Miner A-22XB friction draft gear in conjunction with the American radial Type D coupler and vertical-key yoke, which is interchangeable with any A.R.A. standard Type D coupler and cast-steel yoke, the center sills being slotted to accommodate a horizontal key.

In this draft attachment constant bearing areas are maintained, irrespective of angularity, in transmitting heavy loads from the coupler to the draft gear, and from the draft gear to the center sills through substantial draft lugs. The function of the radial coupler is ma-



National Type B truck—Designed to expedite the changing of wheels

terially to reduce maintenance on draft riggings.

The side door applied is designed to eliminate the trouble frequently experienced with doors jamming and necessitating the use of bars to move them, usually with destructive results. The type of door on the new box

(Continued on page 538)

Rebuilt 4-6-2 Compound Locomotives Show Economies

Orleans System of France by modifying the steam passages and its distribution, increasing the superheat and applying Thermic syphons to 20 Pacific type compound locomotives, obtains 50 per cent more horsepower available at the tender drawbar

IN an article which appeared in the July, 1931, issue of the Revue Generale des Chemins de Fer, M. Andrew Chapelon, division inspector for the Orleans Company, France, described the results of an elaborate series of comparative dynamometer tests which the railroad made with a 4-6-2 type compound locomotive, No. 3566, which had been changed by the application of a Nicholson Thermic syphon and two exhaust nozzles in connection with a double stack, enlarging the superheater and applying Lentz poppet valves of the oscillating cam design actuated by a Walschaert gear. Originally steam distribution to the high-pressure cylinders of this locomotive was effected by piston valves and by flat slide valves to the low-pressure cylinders.

As a result of these tests with locomotive No. 3566, the Orleans Company, formerly the Paris-Orleans Railway, is rebuilding twenty of its 4-6-2 type compound locomotives which were originally built in 1909 by the Societe Alsacienne de Constructions Mecaniques for express-passenger service. The rebuilt power is scheduled for delivery in 1932. As originally built, these locomotives performed satisfactory service, but the continued increase in tonnage to be hauled at high speeds made it necessary to operate them at maximum capacity, with little margin to meet unforeseen delays to schedules.

Locomotive No. 3566 was rebuilt at the Tours shops of the railroad. The tests showed an increase of 50 per cent in hauling capacity at the tender drawbar, a decrease of from 10 to 25 per cent in water consumption, a coal consumption of 2.7 lb. per drawbar hp.hr., and the ability to haul the required tonnage at increased sustained speeds.

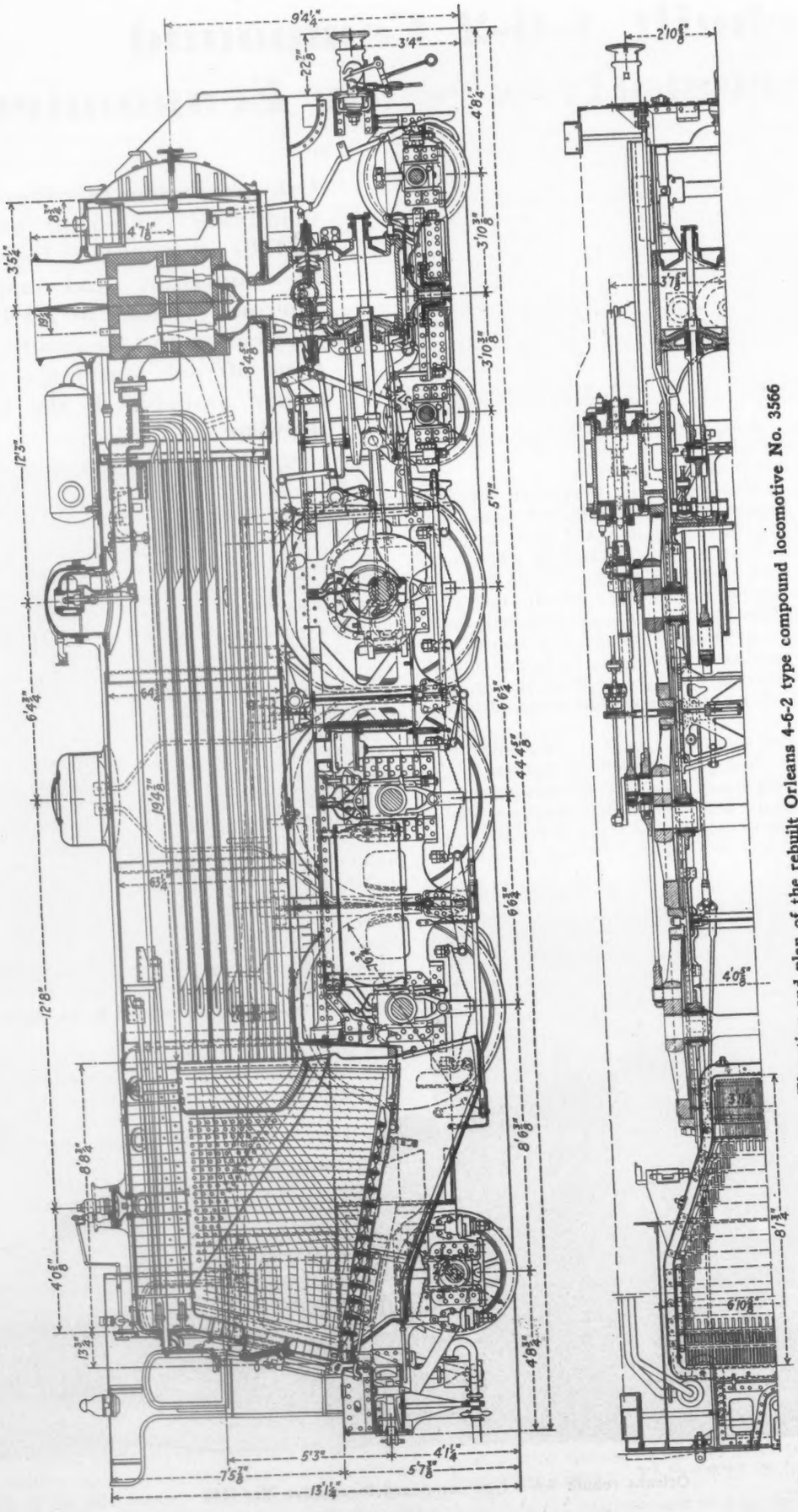
Monsieur Chapelon, in his article, reviewed the development of the 4-6-2 type compound locomotives from the time this type was first placed in service on the Paris-Orleans in 1909. The development of this type of power was supplemented by extensive dynamometer road tests, the first 4-6-2 type compound locomotives being compared with the performance of 4-4-2 and 4-6-0 type compound locomotives with flat slide valves which were formerly used for express passenger service. The principal result of the early series of comparative road tests with 4-4-2 and 4-6-0 type locomotives with a design of 4-6-2 types built in 1909 and 1910 resulted in the procuring of 39 locomotives, series Nos. 3551 to 3589, inclusive. These locomotives which were of the 4-6-2 compound type, were placed in service during 1912 to 1914. They were constructed with slightly modified high-pressure cylinders and with a valve motion, the events of which presented more regularity.

The diameter of the piston valves had been increased from 9.84 to 10.63 in. The maximum section of port opening was increased from 30.64 to 34.9 sq. in. The clearance which also had appeared too small in the first locomotives was increased from 11.5 per cent to 13.2 per cent. Finally, the high-pressure cylinders were provided with a by-pass.

The 4-6-2 type locomotives of these different series rendered good service. They are still hauling the larger part of the heavily loaded trains which are oper-

Courtesy Revue Generale des Chemins de Fer

Orleans rebuilt 4-6-2 type compound locomotive No. 3566



Elevation and plan of the rebuilt Orleans 4-6-2 type compound locomotive No. 3566

ated at high speed over the principal divisions of the system.

Modern Operating Requirements Created New Problems

However, it appeared necessary during the years following the war to improve the performance of these locomotives, especially with a view to enabling them to maintain the highest speeds, 71½ to 74½ m.p.h., under satisfactory conditions of economy.

A trial of double-admission valves of the Allen or "trick" type, applied to the high-pressure cylinders (piston valves) and to the low-pressure cylinders (flat slide valves) was made in 1923 on engine No. 3584.

The experiments made on this locomotive showed that the cut-offs both for the high-pressure cylinders and the low-pressure cylinders could be substantially reduced with this type of slide valve without the tractive force being diminished. On the contrary, the maximum power of the engine remained substantially the same. The maximum speed attained was practically the same as that of other locomotives of similar design, but without the change in valve design.

The good effects produced through reduced throttling at the admission, due to the double-admission orifices of the valves, were lost at heavy admissions and at high speeds through the exhaust back pressures which remained equal, with the same expenditure of steam, to what they were with the valves previously employed.

In 1925 the results obtained in Austria with the Lentz valve motion with horizontal valves* appeared to furnish a solution of the problem. It was decided to apply this gear to two engines of the 3500 series.

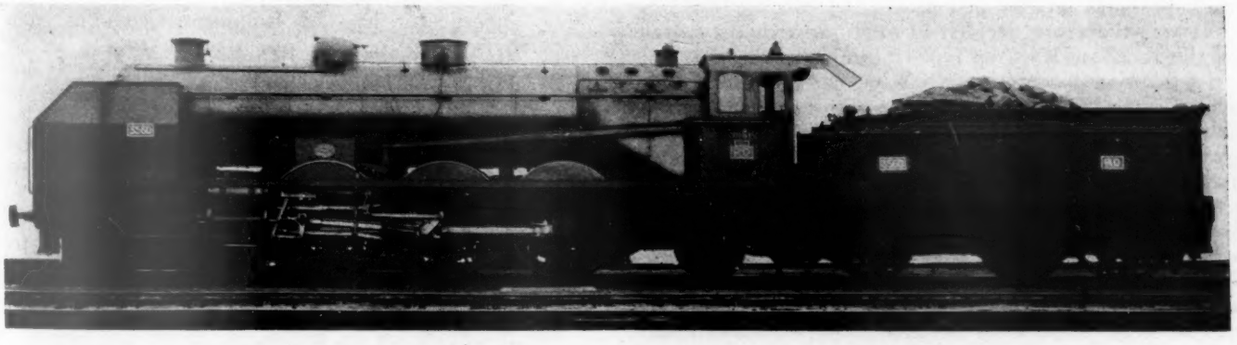
Dynamometer tests made on one of these locomotives showed that no improvement had been made through the substitution of the Lentz valves. A study of the question, which was undertaken without awaiting the results of these tests, led to the conclusion that any improvement in the performance of the No. 3500 series could not be fully obtained except by changing the valve motion and the steam passages at the same time.

An examination of indicator diagrams taken in 1911 on engine No. 3545 showed considerable loss as the steam passed from the boiler to the high-pressure cylinders, thence to the low-pressure cylinders, and to the atmosphere.

An analysis of different studies of the problem made

Comparison of the dimensions, weights and proportions of the Orleans rebuilt 4-6-2 type compound locomotives

Railroad	Orleans Company	
Builder	Societe Alsacienne de Constructions Mecaniques	
Built	1912	1912
Rebuilt	.....	1929 (Co. shops)
Road numbers	3551-3589	3566
Type of locomotive	4-6-2	
Service	Passenger	Experimental
Cylinders, diameter and stroke	{2 H.P.—16.5 in. by 25.6 in. {2 L.P.—25.2 in. by 25.6 in.	
Valve gear, type	Walschaert	Lentz horizontal valves, Walschaert motion
Valves, piston type, size	10.6 in. H.P.	.....
Maximum travel	{5.1 in. H.P. {5.7 in. L.P.	.....
Steam lap	2.12 in.	.....
Exhaust clearance	{.236 in. H.P. {.394 in. L.P.	.....
Cut-off in full gear, per cent	{78.5 H.P. {80.0 L.P.	.....
Valves, oscillating-cam type:		
Admission valves, diameter	.....	{7.26 in. H.P. {8.65 in. L.P.
Exhaust valves, diameter	.....	{7.66 in. H.P. {9.44 in. L.P.
Maximum stroke, admission valves	.....	{.962 in. H.P. {1.12 in. L.P.
Maximum stroke, exhaust valves	.....	{.944 in. H.P. {1.10 in. L.P.
Steam lap, one quarter stroke	.....	15 deg.
Exhaust opening	.....	{6 deg. H.P. {7 deg. L.P.
Cut-off, per cent	.....	{79.5 H.P. {82.0 L.P.
Weights in working order:		
On drivers	116,800 lb.	125,662 lb.
On front truck	51,200 lb.	55,335 lb.
On trailing truck	36,750 lb.	37,800 lb.
Total engine	204,750 lb.	218,797 lb.
Wheel bases:		
Driving	13 ft. 1½ in.	
Total engine	34 ft. 11⅜ in.	
Wheels, diameter outside tires:		
Driving	76¾ in.	
Front truck	37¾ in.	
Trailing truck	45¾ in.	
Boiler:		
Type	Straight top	
Steam pressure	227.57 lb.	
Fuel, kind	Soft coal (Briquettes)	
Diameter, first ring, inside	64¾ in.	
Firebox, length	110½ in.	
Firebox, width, front	39 in.	
Firebox, width, rear	71¼ in.	
Tubes, number and diameter	151—2 in.	80—2 in.
Flues, number and diameter	24—5 in.	40—5 in.
Length over tube nue sheets	19 ft. 4⅞ in.	
Grate area	45.96 sq. ft.	
Heating surfaces:		
Firebox and arch tubes	165.45 sq. ft.	164.1 sq. ft.
Thermic syphon	.....	26.5 sq. ft.
Tubes and flues	2,163.3 sq. ft.	1,787.64 sq. ft.
Total evaporative	2,328.75 sq. ft.	1,978.24 sq. ft.
Superheating	678.69 sq. ft.	784.18 sq. ft.
Combined evaporative and superheat.	3,007.44 sq. ft.	2,762.42 sq. ft.
General data:		
Max. rated tractive force, estimated	35,650 lb.	38,770 lb.
Cyl. hp. at 62¾ m.p.h., test	1,923 hp.	2,710 hp.
Weight proportions:		
Weight on drivers ÷ total weight engine, per cent	57	57.4
Weight on drivers ÷ tractive force	3.27	3.25
Total weight engine ÷ comb. heat. surface	68.2	79.2
Boiler proportions:		
Tractive force ÷ comb. heat. surface	11.88	14.0
Tractive force × dia. drivers ÷ comb. heat. surface	912	1,075
Firebox heat. surface ÷ grate area	3.61	4.14
Firebox heat. surface, per cent, evap. heat. surface	7.1	9.63
Superheat. surface, per cent, evap. heat. surface	29.4	39.6
Comb. heat. surface ÷ grate area	65.5	60.4



Courtesy Revue Generale des Chemins de Fer

One of the same series of locomotives as the No. 3566 previous to rebuilding

* For a description of this gear see the *Railway Mechanical Engineer*, July, 1924, page 407.

it apparent that, to obtain maximum performance from the compound engines, it was necessary to conform strictly to the following conditions: (1) To provide compound engines with steam passages allowing only minimum loss from the boiler through the high- and low-pressure cylinders to the atmosphere, the passages to consist of pipes of large diameter and arranged as directly as possible; (2) to provide compound locomotives with large admission ports and clearances sufficient to avoid throttling and exaggerated compressions in the cylinders; (3) to provide large steam chests to avoid heavy fluctuations of pressure which are produced when the volume is insufficient; (4) to preserve the independence of the high-pressure and the low-pressure valve motions to obtain, for each condition of running, the best combination of the two.

Measurement of the temperatures of the steam had shown that the degree of superheat in the low-pressure cylinders was practically nil (18 to 36 deg. F.). It seemed opportune to have not only the high-pressure cylinders of the engine, but also its low-pressure cylinders, benefit from the advantages of superheating. It seemed desirable to push the superheat much further than what had been done up to that time on the locomotives under consideration—from 554 to 572 deg. F. It seemed opportune, with due consideration for the behavior of the lubricants and of the castings, to approach as near as possible to 752 deg. F. It was decided to apply these two principles to the second engine of the No. 3500 series which was to be equipped for steam distribution by means of Lentz valves.

A number of supplementary modifications also became necessary to make it possible to obtain the greatest possible advantage from these two fundamental principles.

The search for the maximum efficiency in the action of the steam led to the design, as a natural complement, of steam passages of large dimensions and of correct outline, and an exhaust involving only a minimum of back pressure on the pistons.

It was therefore decided to apply an exhaust nozzle of the K. C. or Kylchap type, the installation of which on 4-6-2 type locomotive No. 4500 had just been completed and which, from the viewpoint of intensive draft, low back pressure and efficiency of combustion on the grates, had given results which were clearly superior to those obtained with other types of exhaust nozzles.

It was desirable to increase the sectional area for the passage of the gases through the stack. A single stack of large diameter would give only mediocre results because of its relatively low height. Therefore, a double exhaust nozzle of the K. C. type was applied.

The large proportions necessary for the superheater to supply the cylinders with steam at a temperature of 752 deg. F. gave occasion to fear a harmful lowering of the thermal output of the boiler because of the relatively small efficiency of the superheating surfaces. As shown in one of the tables, the rebuilt locomotive, No. 3566, has a superheating surface of 784.18 sq. ft. This would, of necessity, have to be of larger area. It was, therefore, necessary to seek to increase the evaporation performance of the boiler on the trial locomotive in other respects.

As limitations were imposed by the general dimensions of the locomotive which had to be retained, it was decided to install a Nicholson thermic syphon.

The desire to reduce by all means possible the consumption of water and of fuel led to equipping the rebuilt locomotive, as well as all locomotives of recent construction with feedwater heaters. Finally, the necessity of being able to maintain the greatest speeds without limitations of a mechanical nature led to the adoption of a cranked axle with balanced cranks and of lighter connecting rods for the low-pressure cylinders, as well as force-feed lubrication of the driving boxes.

Description of the Rebuilt Locomotive

The first locomotive rebuilt was No. 3566 which was originally constructed in 1912 by the Alsac Mechanical Construction Company, Belfort, Alsace, France. It was rebuilt in 1929 in the shops of the company and was returned to service in November of that year.

The principal modifications made to this locomotive can be summarized as follows:

1—Replacing various pipes and devices forming part of the steam passages and securing a substantial increase in the size of the passages.

2—Replacement of the valve motions; namely, the piston valves for the high-pressure cylinders, and the flat slide valves for the low-pressure cylinders by double-seating Lentz valves, controlled by oscillating cam shafts and Walschaert motion.

3—Replacement of the Schmidt superheater of 24 elements with a Robinson superheater with 32 elements.

4—The addition of a Nicholson thermic syphon in the center of the firebox. (Arch tubes are used at either side.)

5—Replacement of the variable exhaust nozzles by a double Kylchap exhaust of a fixed type. This nozzle arrangement required two stacks placed in parallel, as shown in one of the drawings.

6—The application of an A.C.F.I. integral type feedwater heater manufactured by L'Auxiliare des Chemins de Fer et de l'Industrie, Paris.

A certain number of complementary modifications became necessary through the novel operating conditions imposed on the locomotive, such as a crank axle with balanced cranks and mechanical lubrication of the driving boxes.

The temperature adopted for the superheater made it necessary to devise a special system of lubrication for the cylinders. Thus, the condensation lubricator ordinarily used was replaced by a mechanical lubricator.

Superheater and Feedwater Heater

The superheater has 32 Robinson elements, each of which is comprised of four steel tubes 1½ in. in outside diameter. Each element of four tubes is located in one of the flues which are 5 in. in outside diameter. These elements differ from the Schmidt elements in that the return tube toward the smokebox stops at about two-thirds of the distance from the back to the front flue sheet.

The shortest distance from the Robinson superheater loops to the back tube sheet is 11.8 in. as compared to 23.62 in. for the Schmidt elements applied previous to rebuilding.

The feeding of the boiler is effected by means of a non-lifting injector of the Friedmann S. Z. type, No. 10, and by the A. C. F. I. feedwater heater. This heater uses exhaust steam for preheating the water to a temperature above 212 deg. F.

The diameter of the steam cylinder of the pump is 10 in. The diameter of the water cylinders is 8 in. and the stroke of the pistons, 10¼ in. The theoretical maximum hourly output is 5,160 gal. at a speed of 45 strokes per minute.

Cylinders and Steam Distribution

The high-pressure cylinders are provided with automatic by-pass valves of special steel which place the front face of each piston in communication with the rear face when running with closed throttle. The low-pressure cylinders are provided with drifting valves.

Locomotive No. 3566 was also equipped with an intercepting valve which made it possible to isolate the

high-pressure cylinders from the low-pressure cylinders when desired. The main rods from the low-pressure cylinders are of hollow design and heat treated.

The valve motions are independent to permit the engineman to use, as occasion arises, the combination of high-pressure and low-pressure cut-offs considered to be most suitable.

Each high-pressure and low-pressure cylinder has two admission valves and two exhaust valves; that is, one admission valve and one exhaust valve for each end of the cylinder. These valves are of the Lentz double-seat type with horizontal movement and are located over the cylinders. Opening of the valves is by means of bell-crank levers. One end of the bell-crank pushes the valve rods, while the other end oscillates around a stationary shaft which has a fixed support placed in the cam box. At the center of each bell-crank lever is a roller against which the cam for operating the valves rotates. The closing of the valves is effected through the action of coil springs. The admission and exhaust cams are bolted and keyed on the same shaft at 180 deg. The several valve-motion parts, as well as the centering springs and the high-pressure admission valves which are subjected to a very high temperature, are made of special Holtzer steels.

The real advantage resulting from the use of the Lentz valves and from the procedure adopted for the steam passages in the cylinders should be explained. As was pointed out in the beginning of this study the extent of throttling found in the high-pressure cylinders of the 4-6-2 type locomotives equipped with piston valves, as compared with the throttling which existed in the corresponding cylinders with flat slide valves on the 4-4-2 or 4-6-0 type locomotives, showed that the area of the ports had only an illusory significance when the valve motions of the different systems were compared. The effective passage area which regulates the flow of steam through different distribution systems depends, as a matter of fact, on the contraction experienced by the fluid flow in passing through the orifices of the different steam passages.

To be able to compare with exactness the passage areas thus offered to the steam with different types of valve motions, it is necessary to make a careful check with the aid of indicator diagrams.

The double slide-valve throttle was replaced with a throttle with balanced valves of American design. The steam is conducted from the throttle to the collector and thence from the collector to the steam chests through pipes of large diameter—6½ in.

The exhaust consists of two exhausts which function in parallel. The two exhaust pipes are placed one behind the other, as shown in the elevation drawing. Each one of the exhausts has a Kylchap nozzle and a cylindrical bell-shaped nozzle, the latter being placed immediately above the Kylchap nozzle. Each one of the cylindrical nozzles is provided with a four-bar primer, which is placed perpendicularly to and directly above each of the central dividing partitions of the two Kylchap nozzles.

The cylinders, valve motion parts and cam-shaft bearings are lubricated by a Bosch type mechanical lubricator having 20 outlets. This lubricator is located in the cab and is actuated by a drive connected to that of a recording speedometer. Relief valves of Woerner design are placed at the junction points of the lubricating-oil pipes and as near as possible to the points to be lubricated.

The air compressor is lubricated by a Detroit lubricator having one outlet.

To combat the beating down of smoke from the stack, two lateral screens of the type adopted as a result of tests made in the aero-dynamic laboratory of Saint Cyr* have been placed in front on each side of the smokebox, as shown in one of the illustrations.

Road Tests with Locomotive No. 3566

Two series of road tests were conducted with locomotive No. 3566. The first series was to make a comparison between the rebuilt locomotive and the best high-speed locomotives in service on the system and to investigate the limit of the power of locomotive No. 3566, by having it haul suitably overloaded trains. The second was to make a study of the performance of the rebuilt engine and included the taking of indicator diagrams on the cylinders.

Thirty-four tests were run on regular trains between St. Pierre-des-Corps and Angouleme, 126¾ miles; six special trains were tested between St. Pierre-des-Corps and Bordeaux-St. Jean, 216¼ miles, and two special trains between Les Aubrais and Bordeaux-St. Jean, 285¾ miles. The profile of these sections of line includes grades up to 0.5 per cent.

For the tests in regular service, south and north runs were selected, scheduled, respectively, for nominal speeds of 59 and 46½ m.p.h. The corresponding tonnages were about 364 and 547 tons, which corresponded substantially to the maximum loads provided for the 4-6-2 type locomotives of standard design. Six trains on each of these runs hauled by locomotive No. 3566 had the nominal speed increased, respectively, from 59 to 68¼ m.p.h. and from 46½ to 56 m.p.h. Likewise two trains on each run with this accelerated speed had their tonnages increased, respectively, from approximately 364 to 552 tons and from 547 to 643 tons.

Fuel and Water Consumption of Locomotive No. 3566

Figures are from results of selected dynamometer-car tests

Water consumption, lb. per hp.-hr.		Coal consumption, lb. per hp.-hr.	
In cylinders	At tender drawbar	Cylinders	At tender drawbar
Tests between St. Pierre des Corps and Angouleme—133 miles			
13.8	24.2	1.79	3.14
13.8	20.7	1.82	2.91
13.8	25.0	1.84	3.32
13.8	20.7	1.85	2.69
13.0	25.0	1.72	3.16
13.8	21.6	1.84	2.70
12.1	23.4	1.65	3.11
12.1	19.0	1.62	2.46
Tests between St. Pierre des Corps and Bordeaux-St. Jean—216.24 miles			
11.2	19.8	1.59	2.69
12.1	19.0	1.70	2.50
12.1	18.1	1.65	2.31

In regard to the locomotives with which No. 3566 was compared, the data were as follows: Six trains in each direction were hauled by a standard 4-6-2 type locomotive, series No. 3551 and 3589, equipped with a Houlet superheater and a Kylchap exhaust. Four trains in each direction were hauled by a standard 4-6-2 type locomotive, series No. 3641 to 3670, equipped with a Schmidt superheater and an exhaust having three Goodfellow projections. Locomotives of this series differ only in a few details from the series No. 3551 to 3589.

Two southbound and three northbound trains were provided with a second locomotive of the No. 3551 series, of which the two southbound trains had had their nominal speed increased from 59 to 68¼ m.p.h. and one northbound train from 46½ to 56 m.p.h. Two trains in each direction were hauled by a 4-6-2 type single-expansion locomotive, series No. 3591 to 3640, equipped with a Schmidt superheater and Kylchap ex-

* See the Revue Generale des Chemins de Fer for July, 1929.

haust. One of these trains in each direction was run at the increased nominal speed. It was not possible to make the same number of test runs with these last two locomotive assignments because of a failure of the low-pressure slide valves of the compound locomotive and the vibration of the cylinders of the single-expansion engine on the higher speed schedules.

The special trains hauled by engine No. 3566 had tonnages estimated from 349 to 592 tons and nominal speeds of 62, 65¼ and 68¼ m.p.h.

To eliminate errors which might result from the use of different steam-chest pressures, according to the composition of trains and habits of engine crews, all the tests were made with wide-open throttle. The regulation of the power developed by the locomotive was made by means of the brakes. To further eliminate the personal equation the locomotives compared were handled by the same engine crew.

The fuel used had a heating value of about 14,000 B.t.u.

Practical Results Obtained

The alterations made on locomotive No. 3566 made it possible to substantially increase the load and the speed of the trains previously hauled by the 4-6-2 type locomotives. It was possible on one test to increase the load from 349 tons to 558 tons, while the nominal speed was increased from 59 to 68¼ m.p.h. This is, as compared with what is done with ordinary 4-6-2 type locomotives, a load increase of 209 tons and a gain in time of 20 min. on the stretch of 133 miles from St. Pierre-des-Corps to Angouleme.

With another train it was possible to haul 642 tons at a nominal speed of 56 m.p.h. This is a tonnage gain of 64.2 tons and a gain in time of 35 min., compared to the maximum made with the locomotives in regular service.

Finally, the low water consumption of the locomotive made it possible to cover, without stopping, the distance from St. Pierre-des-Corps to Angouleme with a tender tank of 5,820 gal. and a load of 357 tons, at a nominal speed of 68¼ m.p.h. With a tender of 9,800 gal. the distance from St. Pierre-des-Corps to Bordeaux-St. Jean, 216¼ miles, with a load of 444 tons, was covered at a nominal speed of 68¼ m.p.h. and also with a load of 494 tons at an average speed of 62 m.p.h. when the train was steam heated at a pressure of 85¼ lb. per sq. in.

The results obtained in the course of these tests justified the expectation that it is possible to haul trains with a load of 444 tons at an average speed of 68¼ m.p.h. from Aubrais to Bordeaux, 286 miles, with one stop for water at Poitiers.

Contrary to the 4-6-2 type locomotives in regular service, both compound and single-expansion, locomotive No. 3566 could maintain, without difficulty and as long as desired, speeds of around 74½ m.p.h.

Boiler Performance

In spite of the presence of a superheater of large dimensions, a circumstance that is little favorable to the good thermal output of the boiler, and an inferior coefficient of heat transmission between the combustion gases and the steam, the boiler of locomotive No. 3566, provided with a Thermic syphon and double exhaust, has proved to possess a mean thermal output that is substantially equal to that of the boilers of the locomotives with which it was compared.

The thermal efficiency of the boiler of locomotive No. 3566 being substantially equal to that of the locomotives under consideration for the same rate of hourly combustion, it was found that with equal power developed the effective thermal output obtained with the boiler of this locomotive became greater than that of the other locomotives as soon as considerable power was produced. This efficiency is more constant for the rebuilt engine than for the ordinary locomotives. This result, which confers on the boiler of locomotive No. 5366 considerable elasticity with respect to steam generation, can be ascribed to the Thermic syphon, because of the more active circulation of water which gives to the heating surfaces the ability to absorb quantities of heat which remain substantially proportionate to the coefficient of the load on these surfaces.

This result must also be ascribed to the effect produced by the double exhaust which forces into the firebox a quantity of air that is always well proportioned to the process of the combustion, especially at peak loads on the boiler.

The temperatures vary from 662 to 752 deg. F. according to the demands on the locomotive. At the same time the superheating temperatures obtained when the feedwater is preheated are lower than those which are obtained when the feeding is done by an ordinary injector.

Comparison of the Maximum Horsepower Developed at the Tender Drawbar and in the Cylinders

Date	Tons hauled	Distance, ft.	Running time, min.-sec.	Average speed, m.p.h.	Average force at tender drawbar, lb.	Avg. hp. exerted: Dynamometer-car reading, hp.	Avg. hp. exerted: Cylinder hp.	Remarks
12-16-26	497	42,652	7-0	62.14	8,333	1,380	2,075	Locomotive No. 3579 — Tests run between Paris and St. Pierre des Corps
12-16-26	497	55,775	10-6	62.76	7,390	1,238	1,923	
12-21-26	414	52,494	9-36	62.14	5,717	1,164	1,954	
12-21-26	414	72,180	11-11	73.32	4,850	948	1,738	
4- 4-30	406	9,843	1-31	73.82	8,951	1,762	3,030	Locomotive No. 3566 — Tests run between St. Pierre des Corps and Angouleme
4- 5-30	650	39,371	8-12	54.56	11,905	1,737	2,465	
4- 8-30	625	14,764	3-5	49.10	13,779	1,805	2,545	
4- 8-30	625	26,247	4-24½	67.73	9,832	1,775	2,762	
4- 8-30	625	78,742	12-20	72.70	7,804	1,515	2,465	
4- 8-30	625	49,214	7-54½	70.71	8,653	1,632	2,663	
4- 8-30	625	21,326	3-52	62.76	10,858	1,810	2,710	
4-10-30	620	28,052	4-33	70.21	9,921	1,860	2,915	
4-11-30	724	55,775	11-32	54.93	12,125	1,778	2,140	
4-11-30	724	49,869	9-8	61.21	10,692	1,752	2,265	

Increase in Thermal Efficiency

The heat drop of the steam in the cylinders of the rebuilt engine is notably greater than the heat drop obtained in the cylinders of the locomotives of similar type in regular service.

The thermal efficiency corresponding to this heat drop changes from 11 per cent for the ordinary engine to 14.5 per cent, approximately, for the rebuilt locomotive; that is, an increase in thermal efficiency of more than 30 per cent, or a saving in heat by the rebuilt locomotive, as compared with the ordinary locomotive of similar type, of about 25 per cent. If this efficiency is compared with the efficiency of the corresponding Rankine cycle, it will be seen that the relation between these two efficiencies, which measure the degree of perfection of the actual engine as compared with the theoretical engine, passes from about 62 per cent for the ordinary engine to 75 or 80 per cent, according to the degree of superheat used for the rebuilt engine.

If one compares the effective outputs of the cylinders of the rebuilt locomotive on the basis of the water-consumption data, taking into account the quality of the steam produced, it will be found that there is little difference between the thermal efficiency calculated on an

entropy diagram according to the actual heat drop experienced by the steam in the cylinders of the engine and its effective output deduced from the water consumption data. Thus, for a mean value of the actual efficiency of the cylinders of the engine, calculated on six test trains to be 13.84 per cent, the corresponding mean of thermal efficiencies, calculated according to the effective heat drop of the steam in the engine, is 14.3 per cent. The relation between these two figures is 0.97. Allowing for errors in measurement, it corresponds to the heat losses through exterior radiation which would thus reach about three per cent.

One of the principal differences existing between the rebuilt locomotives and the ordinary locomotives lies in the combinations of the high-pressure and low-pressure running cut-offs that can be used on this engine.

In the ordinary compound locomotives, notably in the French compound locomotives with independent high-pressure and low-pressure valve motion, experience has led to the general adoption, as the best cut-off for the low-pressure cylinders, the figures of 60 to 75 per cent. It was possible on locomotive No. 3566 to use much lower degrees of admission in the low-pressure cylinders, combined with the high-pressure admissions in the following manner:

High-pressure admissions, per cent	Low-pressure admissions, per cent
70	60
60	50
50	45
40	42.5
30	40
20	40

The exhaust pressures, in the receiver between the high- and low-pressure cylinders on the old engine, were as high as 49.78 lb. when mounting grades, 28.45 lb. as a maximum at high speed and at full power, and 14.22 lb. at reduced power. However, for locomotive No. 3566 these pressures have increased to 85.34 lb., 56.89 lb. and 35.56 lb., respectively.

These running conditions have brought with them a more equal division of the power developed between the high-pressure and the low-pressure cylinders. Thus between 1,972 and 2,960 hp. the ratio between the work developed by the high-pressure cylinders and the work developed by the low-pressure cylinders has become substantially equal, whatever the speed under consideration. For power lying between 1,480 and 1,972 hp., this ratio varies around 1.5, while in the ordinary compound engines the high-pressure cylinders develop from three to ten times greater power than that produced by the low-pressure cylinders. The combination of cut-offs used on locomotive No. 3566 makes it possible to approach the conditions of theoretical operation, according to which the loss, due to pressure drop without being performed in the exhaust, should be equal to zero. This is a point with respect to the functioning of compound locomotives which has been the reward of a long period of development.

In numerous cases high running cut-offs continue to be used on the low-pressure cylinders of compound engines using superheated steam. This is because the throttling at the low-pressure admission assumes excessive values in the case of small admissions which neutralize and more than neutralize the advantage due to the decrease in exhaust pressures.

The importance of the throttling thus produced in the low-pressure cylinders seems to be the sole reason which prevents the nearly equal distribution of the work developed between the high-pressure cylinders and the low-pressure cylinders, as the latter performs only a very small fraction of the total work during the larger part of the time.

The large steam passages in the low-pressure cylinders of locomotive No. 3566 made it possible to be relieved of the preceding requirements and to raise the low-pressure cut-off to the full extent necessary to obtain an equal distribution of work between the four cylinders.

Performance of Locomotive No. 3566

The consumption figures obtained with locomotive No. 3566 are small, varying from 1.6 lb. to 1.9 lb. of coal per indicated horsepower-hour, and from 11.5 to 13.94 lb. of water. The corresponding consumptions of fuel and water per horsepower-hour developed at the drawbar varied from 2.21 to 3.3 lb. and from 17.78 to 24.62 lb. gal.

The savings made by locomotive No. 3566 over the standard compound locomotive fell between 12.6 per cent for water and 10.35 per cent for coal, as the lower limit, and 19.10 per cent water and 18.71 per cent coal, as the upper limit, according to the tractive force demanded of the engine. The boiler was fed by a standard injector. With the feedwater pump these savings increased to 21.21 per cent water and 16.86 per cent coal on a test run scheduled at 59 m.p.h. and to 25.35 per cent water and 25.80 per cent coal for a train scheduled at an average speed of 56 m.p.h.

It is important to note that on the standard 4-6-2 type compound and the single-expansion locomotives increasing the speed with no increase in load brought with it a remarkable increase in the consumption of water and fuel. On locomotive No. 3566, however, the consumptions remained substantially independent of the tractive force demanded, even when running at accelerated speeds.

Conclusions

Summarizing, the modifications made to the locomotive No. 3566 produced important improvements. They had for effect (1) an increase in available tractive force at the drawbar of about 50 per cent; (2) less consumption of water and fuel—(a) at lower power output about 10 per cent when the boiler is fed by the injector and about 15 per cent when fed with the A.C.F.I. integral pump, and (b) at larger power output about 20 per cent when the boiler is fed by injector and 25 per cent when fed by pump; (3) to increase the practical speed limit to at least 74½ m.p.h.; (4) to produce satisfactory performance and life of mechanical parts even when the maximum tractive force is developed at high speeds for long periods of time.

In view of these results the Orleans Company is rebuilding twenty 4-6-2 type locomotives according to the design developed with locomotive No. 3566. These are locomotives Nos. 3501 to 3520, inclusive, using saturated steam. They were constructed in 1909.

The new power will differ from locomotive No. 3566 by raising the safety valves from 228 to 242 lb. per sq. in. and by replacing the 32-element Robinson superheater with a 28-element Houlet superheater. This will make it possible to increase at the same time the thermal efficiency of the boiler and the passage areas for the gases through the superheater flues. This increase of the passage section for the gases will also make it possible to increase the size of the exhaust pipe and to further diminish the back-pressure on the pistons.

The diameter of the low-pressure admission valves will be increased from 8.66 to 9.45 in., thus profiting to a greater extent from the use of early cut-offs in the low-pressure cylinders.

Make Your Car Foremen Your Assistants*

By T. W. Demarest†

Decreases in divisional overhead supervision and the centralization of supervisory control is leading to a better recognition of the car foreman's responsibilities. Dependence must be placed on him as a directly responsible officer in the control of his own operations

AN important aspect of the problem of getting improved car-department operation is the question of personnel—the kind of men we are developing, and their training, so that they may not only carry on but be able to meet and conquer the new conditions. The past decade has been a period of evolution and it is apparent we are on the verge of another. For at least forty years prior to the period of federal control there had been only minor changes in the operation of car departments. While the old-time master car builder was gradually passing out—and all honor to him—each transportation yard still required a shop repair track. It was still the practice to build a proportion of new cars at the home shops; still the practice, to an extent, to defer car repairs at the first sign of a depression and then when business picked up to order new cars, more or less heavily. It would have been much cheaper to have repaired the bad-order equipment, except that usually the new cars ordered were of better design and larger capacity than the older cars.

At the end of the federal control period, some of us were in almost the last stages. To live at all, immediate constructive measures were necessary. It began to dawn on us that there were too many intermediate terminals and that if a freight car could not be put in shape to run as far as a passenger car without intermediate repairs, it should at least be able to run as far as a locomotive, i. e., over two or three crew divisions; also, that a light-repair track was no place for heavy-repair cars and that the latter operation had better be centralized.

A New Period of Evolution Now Beginning

I believe we are at the beginning of another evolutionary period, and it is essential that we ask ourselves, as relating to car inspectors and car foremen: Will these men occupy more important positions than in the past? Are we paying sufficient attention to the selection and development of the right kind of men? In what ways can they improve their efficiency and conserve expenditures for maintenance? It is apparent there is some unavoidable overlap in these questions; but let's discuss them.

Will Car Inspectors and Foremen Occupy More Important Positions?—Insofar as the car inspector is concerned, I would answer "no" and "yes" to the first question. As the result of the development of modern car design, car construction and materials used, the work of the inspector is being materially lightened. The transportation yard inspector should know car construction and materials, and we should be able to depend on his judgment as to the necessity of shopping out a car. He will, of necessity, have to be a bigger man than he is now, and have more responsibility.

The car foreman will have no more responsibility, but his responsibilities will be better recognized and he will be made to assume them. I feel safe in saying that in the period prior to the last decade the car foreman was generally not permitted the development of initiative, nor educated to assume responsibility, his duties being largely confined to direct supervision of labor, with no breadth of contact with the other departments and with small knowledge of costs. When I say costs, I mean it in the broadest way—not the effort to do as little work on the car as would permit him to get it off his hands; not the effort to use unfit material, i. e., material which has practically lived its life; not to have any knowledge of the effect of his operations on transportation costs, but to have the realization that a permanent repair, economically made, is the only cheap repair. I am afraid also that if transportation-yard inspection forces were under his control, as well as the repair-track forces, the proper relation of the different classes of employees to one another was not sufficiently studied.

Selection and Development of the Right Kind of Men.—Good railroad operation hinges largely on the enginehouse and transportation yard. The car foreman is an essential link in transportation-yard operation, and a very vital factor in economic freight-car maintenance. We, perhaps, are just beginning to obtain a better perception of the place he should occupy in our organization, this appreciation being brought about by decreases in divisional overhead supervision, the centralization of supervisory control, and the placing of the car foreman on his own feet as a directly responsible officer.

In the Pennsylvania organization, I am afraid we have given more attention to the car foreman than we have to the car inspector, influenced, no doubt, by the fact that we are making the car foreman the responsible head, not only for repair-track activities, but also for transportation-yard activities, including inspection, lubrication, tests, etc. The foreman of car inspectors is superseded by a gang foreman of car inspectors, who reports to the car foreman. In our education of the car foreman, we have not progressed far enough yet to develop car inspectors for the duties we believe will devolve on the latter in the future.

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* Abstracted from a paper presented before the initial Fall meeting of the Car Foremen's Association of Chicago, held at the Great Northern hotel, Chicago, Monday evening, September 14.

† Mr. Demarest is general superintendent of motive power of the Western Region of the Pennsylvania.

In What Ways Can Car Men Improve Their Efficiency?—I believe, in this question, the cart is before the horse in that it does not recognize the fact that we must first educate ourselves before we can hope to educate our employees. We cannot escape our responsibility and assume that the car inspector and car foreman must do our thinking for us or that they can take our place. Let us revise the question and ask ourselves: "What can we do in the education of our car inspectors and car foremen to increase the efficiency of our operations and decrease our maintenance costs?"

In the Pennsylvania organization, the car foremen and their car forces come directly under the master mechanic who has the car as well as the locomotive departments under him. The master mechanic in turn reports to a superintendent of motive power, who reports to the general superintendent of motive power. The latter has as a part of his organization a chief car inspector, and, if the territory is large enough, the latter may be assisted by one or more general car inspectors. The duties and work assigned to the chief and general car inspectors are such that they are office men for not more than one day a week. It may be pertinent to mention here also that while we have a stores department, this is not a separate department as on many roads, but the storekeepers report to the master mechanics, and the motive power department holds itself directly responsible for the quantities of unapplied material on hand. The above explanation is necessary to clarify what follows.

The first man we have to start with is the general superintendent of motive power. Unless, we, as superior officers, are looking ahead; are able to see that conditions are going to change; have solutions for them in advance; and believe in what we advocate, we are not going to develop men. We have to pass this education on to our subordinates, the superiors of the car foremen, and then to the car foremen, themselves. The easy man to educate is the car foreman; the hard men to educate are his superiors.

"We must first educate ourselves before we can hope to educate our employees. We cannot escape our responsibilities and assume that the car inspector and car foreman must do our thinking for us, or that they can take our place**. Unless we as superior officers are looking ahead; are able to see that conditions are going to change; have solutions for them in advance, and believe in what we advocate, we are not going to develop men."**

Car Men Cannot Be Directed by "Remote Control."—Some operations on a railroad may be handled by "remote control." The education of men and proper control of maintenance costs are not only included in such operations. Letters of instruction are not valuable; they are simply a matter of record. The follow-up, by personal visits and full verbal reasons and explanations, is the only way to bring results and continued improvement. You may be interested in a resume and a discussion of the ground covered during personal visits and the direction taken in our educational efforts with our car foremen.

Cleanliness and Orderliness.—We insist on cleanliness on repair tracks, in buildings, in the space occupied in transportation yards, and an orderly method of caring for tools and supplies. We believe that a primary requisite in the development of men, in obtaining the proper kind of work, and in facilitating maintenance, is a clean, orderly shop and surroundings. We do not believe that good men can be developed in any other surroundings, and we also believe a good man will not only lose his self-respect if compelled to work under other conditions, but will become like his surroundings.

The Reason for Shopping Cars.—In checking over a repair-track situation with a car foreman, we desire to know that he is thoroughly acquainted with the work on his track, why each car has been shopped, when it will be released, the reason for the delay, if any, and whether the reason for shopping the car was a valid one. No car foreman can operate a freight-car repair track economically unless he knows at all times the conditions of his track. We also desire to ascertain whether he has so many cars shopped to his track that he cannot handle the work promptly. Good repair-track operation means the ability to get to the cars promptly after they are set, and release them as rapidly as the work is done.

Quality of the Work Being Done.—Continuous checking is necessary in order that superficial as well as unnecessary repairs be not made and that the repair work being done is completed in a permanent manner; also, to see that instructions in reference to the methods of doing work and the use of material are being followed.

Handling of Loaded Shopped Cars.—The number of loaded cars on his track is carefully gone over, and also the shop records, to indicate whether or not there are shopped-out loads in transportation yards which have not yet been set. His instructions are to handle foreign bad-order loads first, in order to relieve per diem, and, secondly, loads in system cars.

Delays in Movement of Empty Cars.—The empty-car situation is also gone over with him, in this instance foreign empties to be given preference; whether or not there are foreign empties standing out, and why they have not been set; material shortages, if any. System empties are to be given last consideration.

Extent of Yard Damage.—Bad orders being shopped out on account of yard damage are checked over. If necessary, the matter is called to the attention of the yardmaster and perhaps also to the division superintendent and the general superintendent.

Method of Carrying Material and Amount on Hand.—His material supplies are gone over, not only on the repair track, but also in the transportation yard. The condition in which his material is kept, that is, whether or not he is a good storekeeper, and the amounts of the various kinds of material he has on hand, are checked against his consumption records. If there are excess amounts in any direction, he is instructed to send them to our general store-room and is advised that one method of reducing purchases is to make surplus stocks available for regional use rather than divisional.

Relations with the Yardmaster.—We develop whether

or not the yardmaster and car foreman are co-operating fully, and iron out any differences or kinks which may exist. It goes without saying that in the prompt movement of trains, the elimination of per diem, and delay to loads, the two officers must co-operate thoroughly with each other.

Proper Force Relation.—The various labor classifications of his force are gone over with him, and, if necessary, suggestions made to obtain a better balance or possible reductions. The assistant foreman and gang foremen are checked over with him to develop if they function properly; what, if any, further educational means must be taken with them to make them desirable supervision; and whether or not any of them have not reacted and should be set back. If he feels he has any exceptionally bright workmen in his organization who seem to have qualities fitting them for promotion, such men are also discussed with him.

Expenditure of Labor and Material to Date

Our own railroad, as well as a great many others, in order to regulate expenses, operates on a budget plan, and just as we receive our budget allotment for freight-car maintenance for the current month, we, in turn, based on the chief car inspector's knowledge of the requirements at the different repair tracks, budget each one of the repair tracks. The budget is not in the shape of dollars of expenses, but an allotment of man-hours, mechanics and helpers, for the month. The allotment is distributed as between lubrication, inspection and repairs.

The budget allotment to the various expense items in our maintenance-of-equipment appropriation in the majority of cases in the Western Region is on the basis of man-hours, mechanics and helpers, without reference to material. On our car repair tracks, however, we have found it necessary to have a material measure also, as the consumption of some of the more costly items is sufficiently erratic at times to produce an unexpected over-run of an undesired under-run. Each gang foreman, therefore, has a sheet he fills out daily on which there are some 25 separate material items which constitute 80 per cent of the material costs of freight-car repairs, such as air-brake details triple valves, etc., wheels and axles, couplers, draft gear, body and truck bolsters, brake beams, journal bearings, etc. These items are priced on the sheet and as the gang foreman draws any of them for application he simply marks the number of pieces in the appropriate column. At the end of the day he abstracts from his time cards the mechanics' and helpers' hours in his gang. These hours are turned into money at an average rate set up for the track each month by the regional accountant. He figures his total material cost and his ratio of material per dollar's worth of labor. As the operations of different tracks vary, a ratio of material to labor is set up for each track and when this ratio is exceeded the car foreman must take individual action to see that his labor and material allotment is not exceeded. The plan has worked very well, indeed. Frankly, we are trying to make business men of our car foremen and it is quite astonishing how they have been able to readjust their forces without decreasing output, to maintain their operations without exceeding their allowances. It has also exercised a very salutary influence in reducing material charges.

Finally, in relation to the education of car foremen, may I suggest that in meeting with and going over various questions with your car foreman, that you deal with him as if he were an assistant of yours and not a subordinate. He knows a lot of things that you don't know and I have never gone over a car-repair track or through an enginehouse that I did not learn something from the foreman, as well as from the men.

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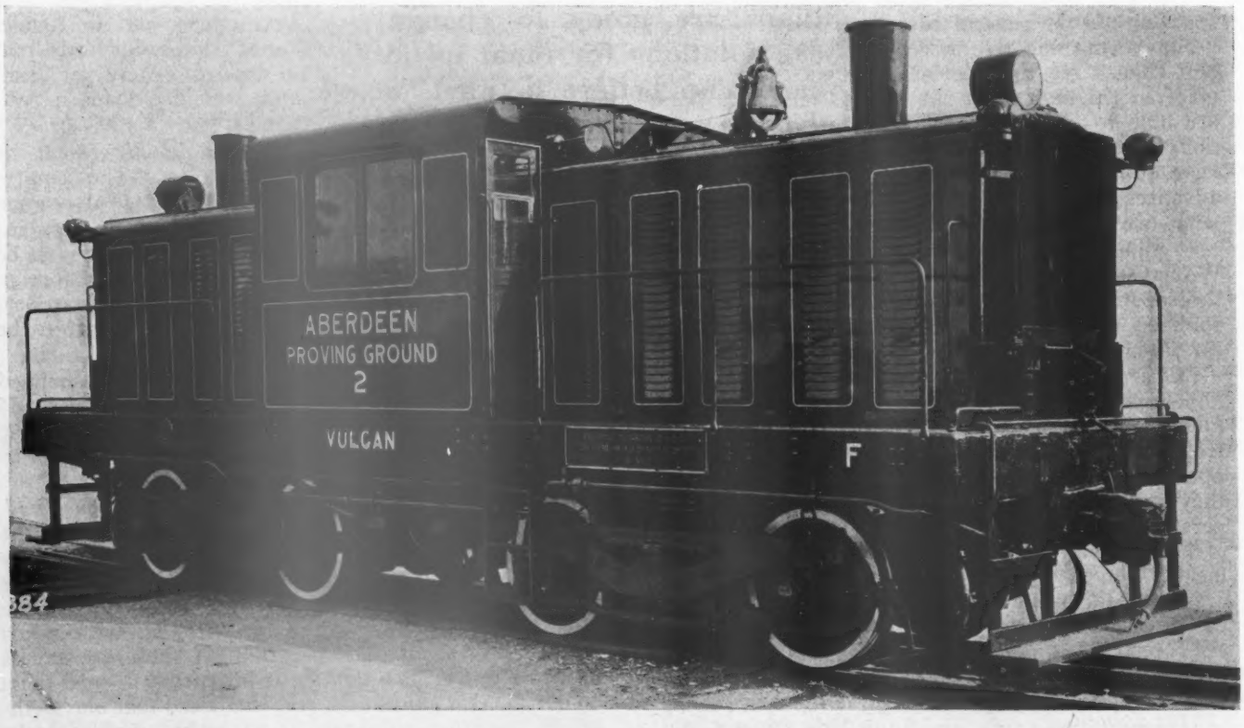

A 50-ton gas-electric locomotive built for the Ordnance Department, United States Army, by the Vulcan Iron Works
Power plant: 2,175-hp., 6-cylinder LeRoi engines driving General Electric 500-volt generators—Starting tractive force 36,000 lb.; maximum speed, about 30 miles an hour.

Scale Prevention in Closed Feedwater Heaters

*By Julius Alsberg**

Results of research begun by the Superheater Company in 1922 to eliminate scale in closed feedwater heaters

THE operation of closed feedwater heaters on locomotives has in many instances been handicapped by excessive scale formation. This has been true of all those roads that use boiler feedwater containing substantial amounts of calcium or magnesium in the form of bicarbonates. These salts come readily out of solution when the water is heated to temperatures of 200 to 230 deg. F., which can be attained in closed heaters heated with exhaust steam.

Many waters that produce hard scale in the boiler do not affect feedwater heaters seriously because such waters, when chemically softened, produce boiler scale by reason of the preponderance of sulphates of lime or magnesia, which sulphates come out of solution at boiler temperatures, but not at the temperatures which are obtained in exhaust-steam feedwater heaters. Thus, those railroads which use softening compounds within the boiler only may not be troubled with much scale in feedwater heaters.

On the other hand, waters that are softened in wayside tanks or locomotive tenders will deposit scale in the heaters, because the softening process converts the sulphates of lime and magnesia into their carbonates, a portion of which are converted into bicarbonates and retained in solution in the water. These bicarbonates, as pointed out, come out of solution at heater temperatures. The insides of the heater tubes then become covered with soft and porous carbonate scale, which builds up the more rapidly the greater the concentration of bicarbonates in the water. Thus water, treated with soda ash only, creates greater difficulties in closed heaters than waters which are treated with soda and lime, because the addition of the latter has a tendency to decrease the amount of calcium and magnesium bicarbonates.

Although the carbonate scale is soft and porous, it appreciably interferes with the heat transfer through the tube walls, lowers the capacity of the feedwater heater and results in decreased fuel saving. When the deposit is allowed to accumulate over extended periods of time, serious stoppages of heater tubes occur, which increases the load on the pumps and proves particularly obnoxious to centrifugal pumps, which fast lose capacity with the rise of head against which they have to pump.

Effect of Leaky Boiler Checks

These troubles are usually accentuated by a tendency of boiler checks to leak in spite of proper maintenance. Such leaks increase the water temperature in the heater tubes when the engine is standing considerably beyond the temperatures which obtain during the use of the heater, so that harder scale-forming ingredients, such as sulphates and silicates, may become mixed with the carbonates and destroy the soft porous character of the deposit. It has thus been customary to clean the heaters periodically with dilute muriatic acid which readily acts on the carbonates, producing calcium and magnesium chlorides and carbonic acid gas.

Realizing that the proper way to deal with the problem is the prevention of scale formation by some means rather than allowing the scale to form and remove it by acid, The Superheater Company initiated a study and research on this subject as early as 1922 and more recently carried this work to what appears to be a satisfactory ending.

Use of Anti-Foaming Compounds

Early in its experience of servicing its heaters on railroads this company observed that the use of anti-foaming compounds was helpful in keeping heater tubes clean. This fact was recognized to be due to the collodial action of tannin, one of the ingredients of such compounds.

Tannin, which is an organic substance found in the pulp of the wood and in the bark of a number of trees, such as chestnut, oak and others, is available in the form of liquid extract or in the form of powder. When mixed with water, it goes into a so-called colloidal state which, as is well-known, is really a state of suspension, but of particles so small that they indefinitely stay in that suspension without settling. Colloids, such as tannin and others, have the interesting property of protecting certain other classes of colloids against coagulation (precipitation). This phenomenon is probably related to the character of the electrical charges carried by both the particles of the protecting colloid and by those of the colloid to be protected.

When water carries a mineral substance such as bicarbonate of calcium in solution and is heated to a temperature at which it comes out of solution the bicarbonate, as the theory affirms, is converted into the much less soluble carbonate. The carbonate thus formed first passes through a colloidal state before passing into the crystalline state in which it agglomerates into the scale-forming crystals which are deposited on the heat transmitting surfaces. Thus, when a sufficiently powerful protective colloid—for instance, tannin—is contained in the water when the heat drives the bicarbonates out of solution, the carbonates are being retained by the protective action of tannin in the colloidal state and are not allowed to pass into the crystalline form, and the precipitation of carbonates on the heater tubes can be entirely prevented.

Definite data will be published eventually, but it can now be safely stated that the quantity of tannin required to give good practical results with waters which are softened with lime and soda, and should therefore not contain excessive amounts of calcium or magnesium bicarbonates, can be held small enough so that the cost

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of the treatment compares favorably with the cost of heater washouts. On one railroad, for instance, the addition of 1 lb. of tannin to about 60,000 lb. of water allowed a heater to operate during three months without acid washing, with a loss of not over 25 deg. F. in preheating temperature, whereas heaters have to be washed on that road every ten days to two weeks to be able to secure satisfactory results.

Tannin-Brick Treatment

The most difficult part of the problem was to find a practical and economical means of feeding the tannin. It was felt that in order to obtain a uniform dosage without waste of the fairly expensive material an automatic feeding means should be developed, and consequently a number of devices were tried for feeding both liquid and powdered chestnut extract in proportion to the quantity of water pumped. None of these devices proved satisfactory, largely on account of the tendency of the tannin-bearing extract to oxidize, which caused gummy deposits on pipes and valves through which the material had to be handled. Finally, powdered extract was successfully briquetted into a structure permeated with glue tannate which shows considerable resistance to rapid leaching and from which the tannin goes into solution very gradually.

Briquettes have been made which are rugged for handling at terminals. They are placed in wire baskets and lowered on chains to the bottom of the tender tank through the manhole. The water flowing over the brick into the pump suction slowly leaches the tannin out of the brick structure. The amount of tannin can be, to some extent, regulated by the surface of the briquette as well as by modification of its structure. There does not seem to be any trouble about making briquettes which last from 30 to 35 hours before they completely dissolve in water at 45 to 55 deg. F. As a result, bricks may be made to last throughout the round trip of a locomotive in many instances so that they have to be handled at one terminal only. In any event the bricks will last long enough that the locomotive crew need take no part in administering the treatment. At the same time the maintenance forces are not burdened by the addition of a mechanical feeding device.

Briquettes could also be made for insertion into suitable containers placed in suction or pump delivery pipes, but since tannin is also of the greatest help in keeping scale out of injector tubes and with the location of the brick in the tender no joints have to be made or remade when adding more brick, the basket method seems to be the most suitable.

The tannin-brick treatment was developed for the use of those railroads operating Elesco heaters but not introducing tannin-bearing compounds into the tender water. Where such compounds are used and, incidentally, good feedwater temperatures are maintained without an undue amount of acid washing, the use of additional tannin brick is not indicated. Where they are used but satisfactory feedwater conditions are not obtained, it seems probable that they can be obtained by using tannin brick in addition to the boiler compound or else the latter modified so as to include a sufficient amount of tannin for heater scale prevention.

Whether an emulsion of castor oil and tannin as used in anti-foaming compounds is as effective a protective colloid at heater temperatures as tannin by itself is a question which must be answered by experience. Offhand, it would seem that the tannin must lose at least part of its protective power when emulsified in castor oil.

D. & H. Builds 100 Box Cars

(Continued from page 526)

cars is known as the Youngstown steel door. It is carried on Camel bottom supports with roller lock-lift arrangement. The construction is such that when at rest the entire weight of the door is shifted from the rollers to the bottom door track. The door is bottom hung and operates on rollers which are provided with roller bearings. To open or close the door it is only necessary to pull down slightly on the lifting lever which is stenciled "Pull." The movement of the lever raises the door from the track and its weight is transferred to the rollers. Above the door opening is a retaining Z-bar. When the door is closed this bar seals the top of the door and prevents water from entering the interior of the car. An additional feature is the door lock and wedge-shaped sealing pin. If this type of door is allowed to remain open, either fully or part way, it remains in that position until released. Thus, damage to the door, posts, guides, etc., is minimized.

The Operation of the Spot System

Construction of the cars was facilitated by the use of effective labor-saving devices and equipment. For example, at the truck assembly station there is a one-ton air-motor hoist which travels on a boom having a 16-ft. radius. The two men engaged in assembling the trucks are thus relieved of the labor of handling the heavy bolsters and side frames. When the trucks are completed they are advanced to the point where the center sills are stored. Here the sills are placed on the trucks by means of a one-ton Fordson gasoline tractor equipped with a 14-ft. boom. This tractor also carries the cover plate, side sills, side-sill angles and top-side angles from points of storage to the underframe assembly station.

Draft-gear units are compressed in the yokes under air pressure in a machine specially designed for the purpose. They are then conveyed on a three-wheel wagon equipped with an air jack and raised to the proper position under the car. The coupler is then elevated by an overhead air-motor hoist and the installation completed with but little manual effort.

The steel superstructure and Hutchins channel-steel ends are laid on metal horses, riveted together and then placed in position on the underframe by means of overhead air-motor hoists. At the last station the Hutchins Universal roof is assembled. The work is carried on from an overhead platform where the various roof parts are readily accessible.

With the exception of the truck and paint work, the building operations are completed under cover. As is the case at any plant where piecework is the basis of compensation, the material layout has been closely studied and the car parts, so far as possible, stored in close proximity to the station where needed. The distribution is handled by two men, also on piecework.

Each car receives two spray coats of paint. The color of the super-structure, excepting the roof, is brown, while the roof, underframe and trucks are painted black. The appropriate stenciling and markings are applied by air-operated spray-painting equipment. Under this arrangement metal stencils are employed, thereby assuring uniformity of application. Consequently the use of brushes is practically dispensed with. The cutting of paper stencils is no longer required because of the substitution of the metal stencils which seldom require renewal.

Dunn and Lee Elected Leaders of Simmons-Boardman Companies

Samuel O. Dunn,
Chairman of Board

New chairman of the board and president have been associated with the company for a quarter century—The former has been vice-president and editor-in-chief and the latter vice-president in charge of business department

Henry Lee,
President

THE election of Samuel O. Dunn as chairman of the board and of Henry Lee as president of the Simmons-Boardman Publishing Company, to succeed Col. E. A. Simmons, deceased, placed in executive charge of its management two men who have been associated with it for a quarter century. Mr. Dunn was born on March 8, 1877, at Bloomfield, Iowa. When 12 years of age, he began to learn the printer's trade, and at 18 was editor and publisher of a newspaper at Quitman, Mo. After four years as associate editor of the Maryville (Mo.) Tribune, he joined the staff of the Kansas City Journal in 1900, and was promoted to editorial writer two years later. Beginning in 1904, he was for three years an editorial writer on the Chicago Tribune, during which time he began to specialize on transportation matters.

Mr. Dunn became an associate editor of the old Railway Age in January, 1907. A few months later he was made managing editor. On June 1, 1908, when the old Railway Age and the Railroad Gazette were consolidated to form the Railroad Age Gazette, he was appointed western editor. Mr. Dunn was appointed editorial director in 1910, and on October 1, 1911, succeeded W. H. Boardman as editor. At almost the same time, he completed the study of law to which he had devoted much of his spare time, and was admitted to the bar. Expansion of the company brought parallel expansion in his duties, as he became editor-in-chief of all papers acquired and established.

Mr. Dunn has been a frequent contributor to magazines and speaker on transportation subjects. He is the author of "The American Transportation Question," published in 1911; "Government Ownership of Railroads," published in 1913; and "Regulation of Railways," published in 1918, as well as numerous articles published in Scribner's, the Atlantic Monthly, the Review of Reviews, World's Work, Nation's Business, etc. He has lectured on transportation subjects at a large number of universities, and has spoken on transportation problems, before such organizations as the Investment Bankers Association, the Chamber of Commerce of the United States, the Railway Business Association, the National Metal Trades Association, the National Association of Manufacturers, the National Industrial Conference Board, the Rivers and Harbors Congress, and the Associated Traffic Clubs of America. He was a delegate of the American Railway Association to the International Railway Congresses at Rome in 1922, and at London in 1925. He is a member of both the Railroad Committee and the Inland Waterway Transportation Committee of the Chamber of Commerce of the United States, and is a former president of the Associated Business Papers, Inc.

In addition to his duties as chairman of the board of the Simmons-Boardman Publishing Company, Mr. Dunn will continue as editor of the Railway Age.

Mr. Lee was born at Hamlet, Ill., on May 25, 1884, and received his education at the Aledo, Ill., high school and at the Metropolitan Business College at Chicago. He joined the old Railway Age at Chicago in 1905, and was assigned to the news staff in 1906. A year later he was appointed associate editor and transferred to New York. Upon the consolidation of the Railway Age and the Railroad Gazette in 1908, Mr. Lee was transferred back to Chicago, and a year later was placed in charge of the make-up department at New York. Later in 1909, Mr. Lee was placed in charge of the copy service department, shortly after which he was made a sales representative of the company. He was elected secretary in 1910 and was elected also treasurer in 1911. Mr. Lee was elected a director of the Simmons-Boardman Publishing Company in 1912, and became vice-president and treasurer in 1916.

Mr. Lee has been active in various organizations, including the Federation of Trade Press Associations (now the Associated Business Papers, Inc.), of which he was secretary-treasurer in 1910-11. He was successively secretary, vice-president and president of the New York Business Publishers Association during the years from 1916 to 1919, and was a director of the Technical Publicity Association in 1918. During the war he served as chairman of the Business Press division for the several government loans, and following the war served for two years as a member of the Surplus Property committee of the War Department. In 1929, he was elected vice-president, director and member of the executive committee of the Simmons-Boardman Publishing Corporation, and in the same year was elected vice-president and a director of the American Builder Publishing Corporation.

EDITORIALS

Economies in Car Washing

Marked economies in the washing of passenger-train cars previous to painting or the making of heavy repairs have been accomplished on the Chicago, Milwaukee, St. Paul & Pacific, and no doubt on other roads, by the substitution of mechanical spray-washing methods for previous manual washing.

By the spray-washing method, a hot chemical solution is sprayed on the car interior or exterior from a suitable nozzle; the car is scrubbed to loosen the dirt, and water from a second hose is used to rinse off the dirt. Advantages of this system include the cleaning of relatively large surfaces with a great reduction in lost motion and savings of time and labor. All-steel express cars which, for example, were formerly washed inside and out in about 34 man-hours per car are now washed in 6 man-hours. Steel coaches, washed on the outside in 24 man-hours by hand, are washed by the spray method in 4 man-hours. In a test involving a total of 44 inside and outside car-washing jobs, 954 man-hours were required by the former hand method, as compared to 416 man-hours by the spray method, or a reduction of 12.23 man-hours per job. At an average cost of 57 cents per man-hour, the average saving per job was $6.97. This is for the car bodies alone and, when the saving due to the more rapid spray-washing of trucks is added, it is apparent that the spray method of car cleaning should receive the careful attention of car-department officers interested in the more satisfactory and more economical cleaning of passenger-car equipment.

Broad Shoulders And Thick Skins

Reduced forces, in many instances practically no force at all, plus depleted stocks in the storehouse, have not simplified the problems of the enginehouse foreman. One road says: "We are receiving many reports of engines found defective by I. C. C. inspectors and are also having a large number of engine failures due to defects existing and, in some instances, being reported by both enginemen and engine inspectors which should have been repaired prior to the engines being dispatched."

As is customary, and expected in most railroad organizations, the operating officers censure the mechanical department heads who in turn pass the "good word" along down to the enginehouse foremen. As a rule remarks conveying censure are not toned down in the process of transmittal. The enginehouse foreman generally has no choice but to "sit and take it." Practice in this operation has developed remarkably "broad shoulders" and a "thick skin" on most enginehouse foremen. There are, nevertheless, limits to the breadth and thickness, respectively, and the morale of the enginehouse foreman and his mechanics, who are loyally striving to do a job under extremely adverse conditions is at a low ebb. Right now these men need support from their immediate superiors, especially from attacks higher up. Camouflaging bad conditions by blaming them on "incompetent supervision," especially when there is no one to supervise, cannot help matters.

Heat Wastes In Power Plants

In the urge to take every possible step to prevent the waste of fuel, master mechanics, shop superintendents, and other mechanical-department officers who operate stationary steam boiler plants, should not forget that a dollar saved in power-plant fuel is worth just as much as one saved in locomotive fuel. In preparation for the coming winter season, therefore, when steam power requirements will be supplemented by the need for steam for heating purposes, the following are some of the places to look for the wastage of heat about steam boilers, according to an informative fuel-economy poster, recently issued by the Federation of British Industries:

(1) Unburned fuel in ashes. Avoid waste by cleaning fires carefully and by using suitable firebars. (2) Smoke and incompletely-burned gases. Avoid the production of black smoke and gases not completely burned by regular and frequent hand firing of coal in small quantities, or by proper adjustment of the stoker feed rate. Maintain the proper depth of fire. (3) Excessive draft. Regulate the draft by the dampers to reduce the excess air, endeavoring to obtain 12 per cent CO_2 in the chimney gases. (4) Holes in the fire. Keep the grates properly covered with a level fire, using the rake, when necessary, for this purpose. (5) Air leakage. Examine the boiler setting carefully for air leakage, particularly at furnace doors, cracks in the side walls, joints between the boiler shell and brick work and the damper slides. (6) Keep the boiler surfaces free from soot and flue dust. (7) Keep the internal boiler surfaces free from scale. (8) Do not force the boilers unnecessarily. (9) Examine the seating blocks and partition walls carefully, repairing, if necessary, to avoid by-passing the gases. (10) Lag the exposed surfaces of boilers and steam pipes effectively. (11) Avoid excessive blow-down. (12) Keep the boiler filled to the working level by a continuous and steady feed. (13) Avoid leakages of steam from boiler fittings and valves.

There is little question that considerable amounts of money are being wasted at individual railway power plants, owing, in many instances, to the use of obsolete and inadequate boiler equipment and accessories, much of which has not received the proper attention as to its maintenance. Decided improvements can, in many cases, be effected by attention to some of the details mentioned above, and it is particularly essential that periodical checks of boiler operation be made, using the necessary steam flowmeters, fuel and water measuring devices, CO_2 recorders, electric meters, ther-

mometers, and other equipment needed for an accurate knowledge of just what is being accomplished. Without this knowledge, it is difficult, if not impossible, to know exactly what part of the boiler equipment is functioning at less than the desired efficiency and needs attention.

Shop Use of Skids

The notable increase in the amount of material handled on skids at railway shops and engine terminals, particularly within the last year or two, has undoubtedly had an important effect in reducing costs. One large system uses at its shops, alone, 6 power lift trucks, 29 hand lift trucks, 902 flat skids, 11 tractors, 16 electric crane tractors and 135 tractor-trailers.

Skids are used for the collection of metal chips and borings in the shops which are subsequently dumped into the proper scrap car without the extra handling required when storage bins are used. Parts stripped from locomotives are placed in steel baskets, washed in lye, and moved on skids to the various shop departments for repairs, and back to the locomotive with a minimum of manual handling. Cylinders of oxygen and acetylene, formerly moved two at a time on a two-wheel truck by two men, are handled on a skid equipped with a rack which holds 12 cylinders, delivered to convenient locations in substantially less time than formerly required for handling two cylinders. Running boards, previously handled on two-wheel carts, are now moved about the shop in complete sets by tractor methods at a saving of 8 man-hours per locomotive. Cabs also are now handled on a skid equipped with a specially-constructed frame, mounted on a revolving plate, in 6 min., as compared with 30 min. by former methods. Another special skid which is a great labor-saver is designed to handle jacket iron, while standing edgewise on the skid between two hinged steel side frames, either one of which may be lowered for the ready placing of jacket iron sheets on the skid. Materials such as front-end netting, grates, cab fixtures, spring rigging, etc., are kept in sets in skid containers, readily available when required. Lagging is also similarly handled, to advantage.

Unquestionably, for certain materials used under special conditions, wheeled trailers are better suited than the less mobile skids, but the latter have their own peculiar advantages and, in general, can effect not only a substantial saving in labor, but can also contribute to safety, as well as order and cleanliness in shop operation.

Power Trucks at Shops and Enginehouses

Almost no single tool shows greater adaptability to a wide variety of railway operations and greater promise of economy than the various types of power trucks now on the market. In fact, a revolution in material-handling practices at railway locomotive shops, car shops, engine terminals, etc., has been going on for some time in the substitution of industrial tractors, crane trucks, lift trucks, and other trackless power for hand methods of moving materials. This equipment, where judiciously installed, has shown striking economies and not only reduced labor expense, but also speeded up material deliveries, reduced the time of equipment in shops undergoing repairs, and, hence, had a highly favorable effect on railway operating expense.

Steam locomotive repairs, which is one of the largest items of railway operating expense, is directly affected by material-handling methods. With the proper power tractor and truck equipment, not only are material deliveries from the store-room to the shop handled at reduced expense, but intershop deliveries are expedited and shop men do not have to interrupt their work to go out and get necessary materials. It is said that on the Canadian National, for example, two tractors save $1,400 per month in shop delivery work alone by relieving 3,600 man-hours for shop work. This is a conservative picture of the savings commonly reported where heavy materials are hauled considerable distances. On another road, tractors and trailers are estimated to save the mechanical department $5,000 a year at one shop in flue handling alone.

Car repairs represent a larger item of expense than locomotive repairs, and the same comments regarding the necessity for modern power truck and tractor equipment apply. Increased flexibility in material handling is attained and the use of skids permits moving lumber and other materials from the point of supply to the point of use with but a single handling. It is reported that on the Nashville, Chattanooga & St. Louis the operation of a single crane truck on car work effects a net saving of $1,000 yearly by handling mounted car wheels, steel center sills, bolsters, and trays loaded with scrap iron. In a car shop on another road, the extensive use of trailers and skids practically obviates the necessity of any car-building material touching the floor.

The economies of motorized operation in connection with scrap-handling work, where tractors and trailers can reduce the number of men required to pick up materials, are very striking. On the Chesapeake & Ohio, all scrap iron from one car-repair yard is moved by trailer directly to the scrap dock where most of it is dumped into cars for the market without further sorting. One lift truck, with suitable skids, on the Missouri Pacific is reported to have made possible the handling of reclamation plant material with 13 fewer men than when the truck was installed, three additional men being released subsequently. On the Chicago & North Western, the man-power required to move couplers from a steam hammer to the furnace and then to the assembly yards is said to be reduced in the ratio of 13 to 1 in favor of the lift truck over hand-trucking methods. In certain instances, lift-truck and tractor operation has released locomotive cranes and proved generally more satisfactory than traveling cranes or other fixed facilities.

Power trucks, particularly of the crane-equipped type, are a life saver in connection with engine-terminal work when making light repairs to locomotives and conditioning them for further service. The flexibility of these trucks in readily moving material to any place in the enginehouse and furnishing power to lift headlights, boiler fronts, rods, stokers, feedwater heaters, air pumps, etc., is an important asset. Adequate tractor and trailer equipment is also essential for economical enginehouse operation, it being reported that on one road a tractor saved between $500 and $600 a year in cleaning the engine pits alone, while at another point the time saved in this work has made it possible to reduce the labor force from eight men to four men at a saving of $3,700 a year.

Railroad men who are familiar with the way materials were handled at railway shops and engine terminals by "bull strength and awkwardness," not so many

years ago, appreciate the tremendous improvement already effected by power-truck and tractor installations but know that the railroads still have a long way to go before a saturation point is reached for the justifiable use of this type of equipment.

Expensive Economies

During the present business recession there has been a strong tendency for the railroads to undertake the manufacture in their own shops of replacement parts of a number of locomotive specialties, which, under normal conditions, have been purchased from the manufacturers. This has added to the list of things produced by the railroads many which they can not even produce of a quality to meet the requirements of the service for which they are intended and which, therefore, cannot be produced with true economy, no matter what a price comparison may indicate.

In the conduct of major shop operations required to repair locomotives, few of the refinements are called for which are essential to the success of industries devoting their attention exclusively to the production of specialized equipment. Tolerances are generally loose and unstandardized. Materials generally call for little special attention in the heating and machining operations to which they are subjected.

In the production of many specialties the conditions are entirely different. In the development of some of these special devices to their present high state of efficiency, durability and reliability years have been spent in evolving a selection of materials best suited to withstand the peculiar conditions of service to which they must be subjected in the functioning of the completed devices. In some cases ability to withstand excessively corrosive conditions has been the objective. In others it is the ability to withstand severe shocks under which ordinary materials fail repeatedly. In still others, materials to withstand seemingly insurmountable conditions of load or wear have been the object of research after a trial of all of the readily available materials had disclosed nothing adequate to meet the conditions.

Paralleling the search for materials to meet special conditions has been the development of a manufacturing technique which is no less exacting. In some cases alinement of bearings and interchangeability must meet tolerances measured in thousandths of an inch to insure reliability and efficiency in the functioning of the completed device. Such tolerances offer no particular difficulties in specialized manufacture and become a matter of everyday routine procedure. Back of this routine, however, are carefully designed tools, highly developed jigs, fixtures and templates and a system of rigid inspection.

Under the pressure of instructions to keep down purchases of materials and with men laid off and working short time, railway shop supervisors are severely tempted to undertake the manufacture of any spare part of any device which may require renewal, first, because they can under-bid the price of the commercial article by disregarding shop and overhead expenses, and, second, because they are able to provide additional man-hours, of which their employees are sorely in need.

They undertake these operations, however, with severe handicaps. First, they have no adequate knowledge of the kind of material required or of the specialized heat treatment, controlled within narrow limits, which may be necessary to develop the physical properties on which the successful performance of the repaired device depends. Second, where tolerances are close and interchangeability must be maintained, they lack the jigs, fixtures and templates without which the probability of keeping within tolerance limits is extremely remote; third, they are generally lacking in appreciation of the importance of finish. The absence or presence of a few insignificant tool marks may make all the difference between assured reliability and assured failure of a heavily loaded part of special steel.

Many railroad officers and supervisors are inclined not to take too seriously the insistence of the manufacturers of specialties that they be allowed to furnish renewal parts, assuming that the motive behind this insistence is the natural desire to increase revenues and profits, particularly at times when there is no demand for new equipment. That every company which manufactures replacement parts for its equipment has a selfish desire to secure as large a volume of replacement business as possible is, of course, obvious. What is not so obvious, however, is that behind the development of its repair-parts production program was the necessity to protect itself—and the railroads—against the too frequent failures of its equipment when renewal parts were made by the railroads.

Some railroads are paying dearly for an apparent economy in price by the short life of the home-made renewal parts and the unsatisfactory service of the devices of which they form a part.

NEW BOOKS

SPRINGS AND SUSPENSION. *By T. H. Sanders, M. I. Mech. E., M. I. & S. I. and M. I. Loco E. Published by The Locomotive Publishing Company, Ltd., 3 Amen Corner, London, E. C. 4, England. 520 pages, illustrated. Price 30 shillings.*

This is the second book of a series by Mr. Sanders. The first of the series, "Laminated Springs," published in 1923, dealt at length with the calculations, design, details and manufacture of the plate spring. In separate chapters of the second book, "Springs and Suspension," the author gives general ideas and details relative to the suspension of railway rolling stock, street-railway and highway vehicles, and special accessory springs. A third volume, by the same author, entitled "Springs—A Miscellany," which will deal with coiled springs, rubber springs, dynamic deflections, fatigue and spring testing, is contemplated to complete the series.

DICTIONARY OF WELDING TERMS. *Compiled by Fachausschuss fur Schweisstechnik beim Verein Deutscher Ingenieure, Berlin, Germany. 32 pages, 4 in. by 6 in. Paper bound. Price 1.80 reichmarks.*

In order to assist welding engineers in their endeavor to keep abreast of developments in the welding art through the reading of foreign technical literature, the Welding Committee of the Verein Deutscher Ingenieure has prepared this dictionary which translates into and out of English, German and Russian, respectively, many of the welding terms extensively used in these languages, but which, because of their newness, have not yet been included in standard technical dictionaries. The first section of the booklet translates German terms into English and Russian; the second section, English terms into German and Russian, and the third section, Russian terms into German and English.

THE READER'S PAGE

It Pays To Study Chill Worn Wheels

To the Editor:

The subject of chill-worn wheels is a live one at this particular time, more so than ever due to the high speed of our freight trains, rigid construction of cars, heavily loaded cars and heavy rails that reduce the absorption of vibration.

No better practice can be followed by an inspector than to be on the lookout for extreme vibration in car trucks, which is shown by worn bright oil-box bolts, oil-box lids, brake heads and hangers. When such defects are found it is necessary to examine the wheels thoroughly with a view of locating the cause of the vibration. It will invariably be found that the wheel has a flat worn-through-chill spot.

There are, of course, other wheel defects that cause undue vibration which are detrimental to a car, lading and road bed, such as eccentric wheels and wheels cast out of round. These defects are impossible to detect by ordinary car inspection and their discovery is up to the wheel shop.

T. P. Schmidt.

Oil or Water?

To the Editor:

Have you any information about the relative advantages of water and oil as applied to engine-truck, tender and driving-wheel tires for the reduction or elimination of flange cutting? What I mean by the use of water, in this connection, is as a lubricant to reduce cutting as well as to wash sand off the rails.

Oil, placed on locomotive driving-wheel flanges to save wear, is not always successful, and, on this account, we have used water. The particular thing that I am seeking information about is whether the water causes excessive wear of the tire treads. Even without water, sand and grit will lodge on the faces of the brake shoes. The question is whether the running of water on the drivers will materially increase the wear of the treads on the theory that the water will cause more sand to lodge on the faces of the brake shoes than oil will.

My own opinion is that good results are obtained by the use of water.

General Superintendent.

Hard Times Have Their Opportunities

To the Editor:

I am writing you a few lines to congratulate you on the fine make-up and generally interesting issues of the *Railway Mechanical Engineer*. With never a mention of the depression, you keep right on issuing a real monthly text book to us railroaders, which very fact implies a faith that good times will return and that we must keep on preparing ourselves for what will come with them.

Without making any lugubrious references at all (and you could be pardoned if you did), your message is an inspiration to take the present opportunity to overhaul some of our practices and analyze methods thought to be perfect. Temporary closings down are calamities indeed, if that is all they are considered. But, to the few who may be fortunate enough to be kept on, what a wonderful opportunity is offered to make these times the busiest ever experienced—times when, in the quieted plant, our experience is that so much can be discovered that was unsuspected and undiscovered amidst the hustle and whirl of keeping up the schedule. Now we are making the most of it.

Shop Superintendent.

Are You Overlooking This Point?

To the Editor:

Many bad-order freight cars which have A.R.A. defect cards attached covering damages to the car or for improper repairs made by foreign roads are stored in shop yards, and the time limit of the defect cards on many such cars are being overlooked. This limit is two years on cards covering damages and nine months on cards covering improper repairs. This means a considerable loss to the car owners. All cars when received at shop points and held for shop repairs, when found to have such defect cards attached, should have special handling through the shop and the defect cards removed and attached to the billing repair cards for collection. The same attention should be given to cars recommended for retirement when forms are sent in to the general offices, as A.R.A. Rule 94, paragraph 3, provides for the collection of certain material charges when cars are dismantled.

W. H. Shiver.

Disagrees About Side Bearings

To the Editor:

A letter, signed by James McDonnell and appearing in the June issue of *Railway Mechanical Engineer* in reference to proper side bearing clearance is rather misleading. Mr. McDonnell states, "under no consideration should a truck have a flush side bearing, regardless of the fact that the other bearing may have the proper clearance," and further adds "A car with a flush side bearing is susceptible to derailment, especially when entering or leaving a curve."

I differ with Mr. McDonnell. The minimum side-bearing clearance, on cars equipped with metal body and truck bolsters, is $\frac{1}{16}$ in., to $\frac{1}{8}$ in. when the car is balanced on the center plate. The maximum clearance is $\frac{5}{16}$ in., when the car is so balanced. This clearance is between all four side bearings. Now suppose, due to a slight twist in the sills of the car or due to the truck bolster being slightly higher on one side than on the other, that the side bearing clearance on one side is double the minimum or double the maximum clearance with the opposite bearing flush, does Mr. McDonnell mean to infer that this car is not in safe condition for service? If so, let him go out into his train yard and see how many cars he can find that have equal clearance between all four side bearings and I believe he will find that the percentage is against his theory.

H. K. Allen.

With the

Car Foremen and Inspectors

A Machine For Cleaning Carpets

AT the London car shops of the Canadian National a new carpet cleaning machine has recently been constructed.

The object in building this new machine was to replace the hand method formally used involving considerable labor and producing much objectionable dust. The carpets from coaches had been cleaned by spreading them on the floor or on a rack and blowing them from below with high pressure air at about 90 lb. pressure through a fan-shaped narrow slotted nozzle on a short piece of pipe in which was inserted a self-closing valve. The action of such a shaped nozzle gave a rapid vibrating action similar to a severe beating, which loosened up the dust and dirt blowing it up through the carpet. That which settled on the surface was blown off by passing the nozzle over the surface. Two men were usually employed in the cleaning. No provision was made for removing the dust away from the workmen.

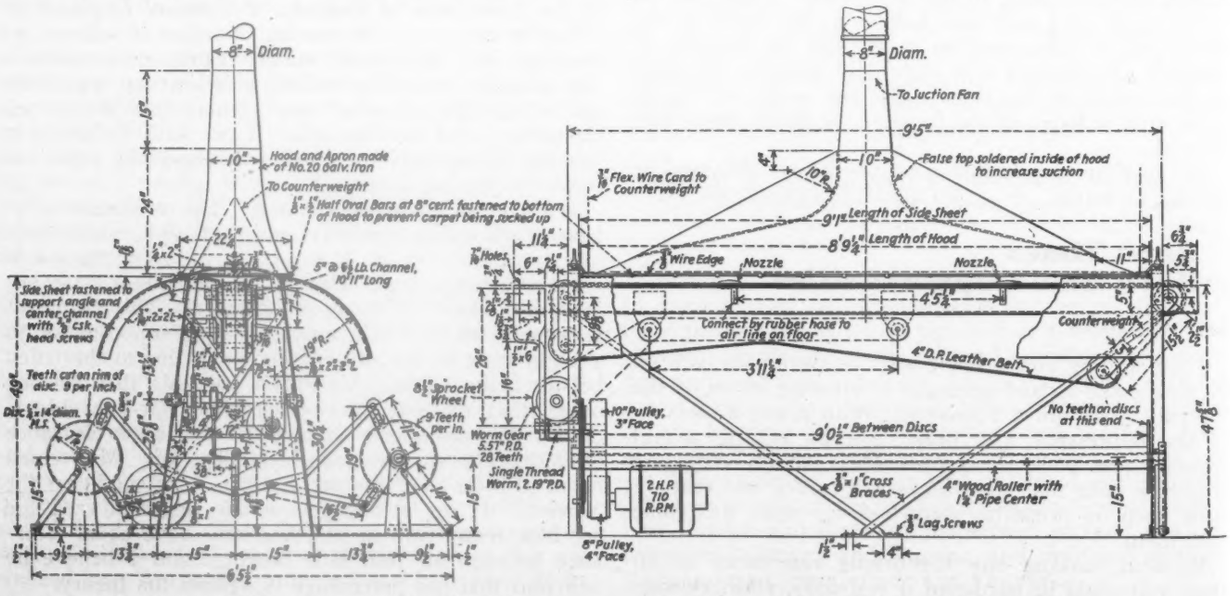
It was felt that a better job could be done by a machine without so much labor and with means of removing the dust from interference with workmen. Such a device was designed as shown in Fig. 1, a photograph of the machine, and Fig 2, a drawing showing the details. The use of high-pressure air was continued for the cleaning but it was necessary to experiment with several different types of nozzles to obtain one that would give the best results.

Most carpet cleaning apparatus is bulky and an endeavor was made to keep the size of the machine as small as possible. To eliminate the troublesome dust it was decided to remove it at the point where it was created and carry it outside of the building so that the machine might be satisfactory for use in the upholstery room where carpets are repaired and some upholstered materials are stored.

The machine was built of structural steel. It consisted of a semi-circular sheet-steel table divided at the highest point, which is about 4 ft. from the floor, in order to let the air nozzle pass through it and underneath the carpet. The table is 9 ft. 5 in. long, and 4 ft. wide at its lower edge.

A machine for cleaning carpets by compressed air

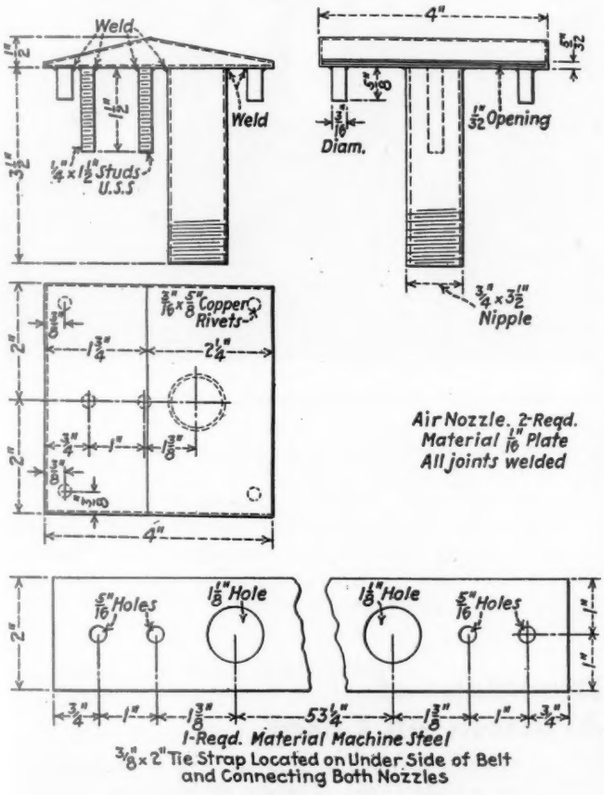
A roller the full length of the machine is located at each side of the apparatus on which to wind and


8" Diam.
To Suction Fan
9'5"
10"
False top soldered inside of hood to increase suction
Flex. Wire Card to Counterweight
9'1½" Length of Side Sheet
8'9¾" Length of Hood
Wire Edge
Nozzle
Nozzle
Connect by rubber hose to air line on floor
Counterweight
4" D.P. Leather Belt
3'11⅛"
10" Pulley, 3" Face
9'0½" Between Discs
No teeth on discs at this end
⅜" x 1" Cross Braces
4" Wood Roller with 1¾" Pipe Center
⅜" Lag Screws
2 H.P. 710 R.P.M.
8" Pulley, 4" Face
Hood and Apron made of No. 20 Galv. Iron
To Counterweight
Side Sheet fastened to support angle and center channel with ½" c.sk. head screws
Teeth cut on rim of disc. 9 per inch
8½" Sprocket Wheel
9 Teeth per in.
Worm Gear 5.57" P.D. 28 Teeth
Single Thread Worm, 2.19" P.D.
5" @ 6½ Lb. Channel, 10'11" Long
6'5½"

Once attached the carpet is moved through the machine and cleaned without further attention

unwind the carpet as it is being cleaned. On one end of each roller there is a notched wheel. By means of a small ratchet which can be thrown into or out of contact with the notched wheel and which is connected through a series of levers to an eccentric motion actuated from the driving motor, first one roller and then the other roller may be thrown into action so that the carpet can be drawn in either direction over the table by manipulating the ratchets. In order to allow the end of the carpet to come to the middle of the table and over the cleaning nozzle a piece of canvas is fastened to each roller long enough to reach the middle of the table. The end of the canvas is equipped with eyelets and strong cord is used to tie the end of the carpet to the end of the canvas through eyelets usually found in these carpets. Where the carpets are not equipped with eyelets a single loop is put through the carpet with a carpet needle and tied to the canvas.

Many railway coach carpets are split and cut out



The air nozzles are of special design

at spots to fit around the legs of seats. In such cases they are tied together at these points by a single loop of cord applied by a needle when they are being placed on the machine. This prevents any of the free ends from moving away from the high pressure when passing over the nozzle. Only a few loops or stitches are necessary so that the labor required is small and can be done as the carpet is being rolled up on the first roller.

After the carpet is fastened to the canvas on one roller and rolled up, the other end is fastened to the canvas on the other roller; the carpet is then ready for cleaning and can be made to pass in either direction over the air nozzle by manipulating the ratchets above mentioned.

One 2-hp. motor is used to drive the mechanism, moving the air nozzle to and fro as well as winding up the carpet on the rollers.

Having fastened the carpet to the rollers the air is turned on and with the motor in operation the carpet moves slowly over the nozzles and the dust and dirt is blown out. Above the table is an adjustable hood, shown in Fig. 1, the full length of the table which is connected by an 8-in. duct to an exhaust fan used for other purposes in the same room. This fan carries the dust away, as it is blown out of the carpet to the outside of the building. This hood can be adjusted down as close to the carpet as necessary to collect up all the dust.

Trials With Different Nozzles

Several different types of nozzles were experimented with. First a piece of ¾-in. pipe with a series of 1/16 in. hole was tried, but this used so much air that it affected the pressure in the shop and also blew considerable dust out into the room from the sides of the carpet. Two flat nozzles with openings 4 in. by 1/32 in. were next tried out. These were directed vertically and were driven by an endless chain, shown in Fig. 2 so that each nozzle moved to and fro half way across the table. This arrangement was satisfactory with respect to the quantity of air used, but the vibrating action was not sufficient and much dust was blown out from the sides of the carpet into the room as the nozzles came near the ends of their strokes.

Two nozzles were then designed as shown in Fig. 3. The air openings were the same size as in the previous case but instead of being directed vertically the nozzles were placed so that the air was directed along the surface parallel to the carpet and the openings both pointed towards the centre of the table. These nozzles were bolted to an endless rubber belt which bridged the gap between the two sections of the table. This belt was given a to-and-fro motion half way across the table by being fastened to the endless chain shown in Fig. 2. The carpet vibrated very rapidly in front of the nozzles, by rubber hose.

This type of nozzle gave very satisfactory operation. The carpet vibrated very rapidly in front of the nozzles, while behind them a slight vacuum was created which held the carpet down to the table and the belt. This permitted the air to pass up through the carpet, carrying the dirt and dust loosened by the vibration so that it could be picked up by the exhaust fan and carried outside the building. The vacuum behind the nozzles prevented any dust from being blown out around the back of the nozzles into the room at the ends of the stroke.

As the table is about four feet from the floor it makes a convenient location for marking the carpets where sections must be cut out for repairing or for scraping off gum or other materials that cannot be blown out.

The superiority of the cleaning over the hand method may be judged by the fact that carpet needles which had to be very frequently renewed on account of becoming blunt can now be used many times as long. Also a much better job of reconditioning with dies, etc., can now be made. The cost of the labor for cleaning is greatly reduced, it being unnecessary for anyone to stand by the machine while it is cleaning. The direction of the movement of the carpet has only to be reversed or the machine stopped as the end is reached. If the carpet is exceptionally dirty, it is passed through the second time. The machine can be varied in speed. The maximum speed requires about twenty minutes for the average length of carpet.

Draft-Key Retainers Held by Rivets

SO much trouble was experienced by an eastern railroad with cotter keys losing out of the A. R. A. draft-key retainers that the application of rivets was adopted.

As all system cars go through the shops for rebuilding or pass over light repair tracks, the cotter keys are removed and a soft rivet is applied. This rivet, if properly applied, will not lose out and requires no further attention, as does the cotter.

A soft rivet instead of a cotter increases the security of the draft-key retainers

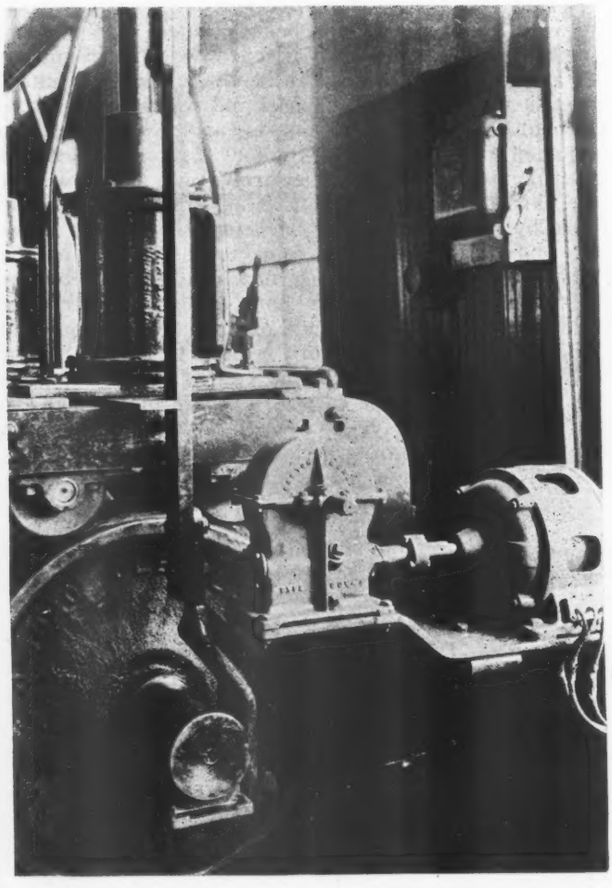
Should it become necessary to remove the draft-key retainer the rivet can easily be removed with a hand hammer and chisel.

While the application of these rivets has only been in effect for one year, the results have been most gratifying.

Device for Wearing-In Journal Bearings

SOME time ago the *Railway Mechanical Engineer* published a short article describing a device for wearing-in journal bearings on car and tender journals. It was operated by an air motor and the brass was held against the journal by spring pressure.

The device shown in the accompanying illustration is electrically operated and shows the car wheel being raised up against the driving wheels with the full weight of the wheels and journal on the brass together with added weight occasioned by the air pressure used to lift the wheels. Two standard journal wedges are welded to the lifting arms and to these the brasses are applied before the wheel is lifted against the two driving wheels. The drive rollers are mounted on a single shaft and cause the wheels to rotate by bearing on the tread.



The full weight of the wheels rests on the journal bearing

This device is helpful in reducing the number of hot boxes resulting from wheel renewals as the journal bearing is already worn in to a perfect seat on the journal before the car is put in service.

Decisions of Arbitration Cases

(The Arbitration Committee of the A.R.A. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

Conditioning Tank Cars for Loading Chargeable to Owner

Keith Tank Line cars are used by shippers of cocoanut oil for the transportation of this lading from Portland, Ore., to points east. On account of requests by the shippers the Spokane, Portland & Seattle has made it its practice to clean and inspect all tank cars destined for cocoanut-oil loading at Vancouver, Wash., while en route to Portland. The Keith Railway Equipment Company questioned the authority of the S. P. & S. to remove dome covers and make any inspection or repairs to interiors or interior fittings of Keith tank cars with-

out being requested to do so, and also the right of the railroad to determine if such repairs were necessary and to bill the car owner. The tank-car company in its appeal to the Arbitration Committee listed 26 specific cases, the bills in each case amounting to from $1.20 to $17.85. The car owner pointed out that all Keith tank cars destined for cocoanut-oil lading were inspected and repaired at its plant at Chicago previous to being moved to Portland. Any cars found in unsuitable condition were immediately repaired at its car shop. It cited two cars which had been thoroughly overhauled, cleaned down to the steel, discharge valves ground in and tested, and forwarded directly to Portland. Nevertheless the railroad cleaned these cars at Vancouver and also ground in the discharge valves. The owner declined to pay the charges listed by the railroad, claiming that the work performed was unnecessary and also pointed out that in its opinion it was better able to place the cars in condition for such shipments than the railroad. The railroad in its statement pointed out that when it first started handling these oils the cars were forwarded direct to the loading plants at Portland. These plants tested all tank cars before loading and in many instances cars were found unfit for loading because of being dirty or having defective heater coils or leaking discharge valves. This made it necessary to haul these cars from Portland to the railroad's shops at Vancouver, a distance of approximately ten miles. This haul included crossing two drawbridges over the Columbia and Willamette Rivers. As a result of this experience the railroad stopped all tank cars in this service at Vancouver for inspection and repairs to avoid the expensive backhaul, delay to shipments and extra switching charges. The railroad submitted with its statement a letter from one of the large shippers of cocoanut oil to the effect that it was imperative that tank cars destined for the shipments of that company's products should be thoroughly cleaned before each loading. The railroad also contended that its charges were authorized by Rule. 16.

The following decision was rendered by the Arbitration Committee on April 10, 1931: "Under Rule 16 the repairs made by the Spokane, Portland & Seattle are properly chargeable to car owner."—*Case No. 1676, Keith Railway Equipment Company vs. Spokane, Portland & Seattle.*

Failure of Weak Draft Arms Drops Underframe on Ties

Union Pacific automobile car No. 171292 was damaged on the Chicago, Rock Island & Pacific near Kremlin, Okla., August 11, 1930. This damage was reported to the car owner under Rule 112 as "destroyed." This report was subsequently withdrawn by the Rock Island and a joint inspection was furnished and the car was reported for disposition under Rule 120. The train, of which this car was a part, was running at approximately 40 m.p.h on a descending grade. The engineman made a 10-lb. brake-pipe reduction to reduce speed when the car failed because of old fractures in the two cast-steel draft arms on the B end. The end of the car, including the body bolster, pulled away from the underframe, allowing the underframe to clear the truck and drop down on the ties. Both trucks remained on the rails. A joint inspection was arranged at the time the car body lay on the right-of-way at the foot of a 10-ft. embankment, having been turned over by a wrecker to clear the tracks. The trucks had been picked up and taken to El Reno, Okla. The superstructure of the car, with the exception of the steel ends, was entirely demolished. The Bettendorf draft arms which were riveted to the single steel center sill showed old breaks immediately back of the body bolster. The Z-bar side sills were also broken over the body bolster. Examination of the track showed that the ties were scored for a considerable distance by the dragging center sill. Both railroads agreed that the failure of the draft arms was responsible for the accident. The Union Pacific declined to authorize repairs, but it did authorize, within the prescribed 30 days, the dismantling of the car, pending a definite conclusion as to the question of responsibility. The Rock Island contended that, with the exception of the damage caused by the car being turned over by the wrecker, there were no Rule-32 conditions involved and that the owner was responsible for the damage caused by the failure of the two side sills, draft arms, two side plates, and all related work incident to the repairing of these parts. It amended its claim by acknowledging responsibility for the additional damage resulting from turning the car over to clear the main line. This meant, it was claimed by the Union Pacific, that the car owner would be assessed with practically all the damage which resulted directly from the car being demolished by the wrecker. The Rock Island claimed that Arbitration Case No. 1638 was similar to the circumstances of this accident, while the Union Pacific was of the opinion that Cases Nos. 1186, 1236, 1342, 1346, 1419, and 1487 were similar, and that the car should be settled for as destroyed, under Rule 112.

The Arbitration Committee rendered the following decision: "The evidence does not indicate that the car was subjected to unfair usage within the intent of Rule 32. Therefore, the owner is responsible for the failure of the car. However, handling line is responsible for that portion of the damage incurred by turning the car over to clear the main line."—*Case No. 1677, Chicago, Rock Island & Pacific vs. Union Pacific.*

Substitution of 12¼-In. for 9¼-In. Coupler—Improper Repairs

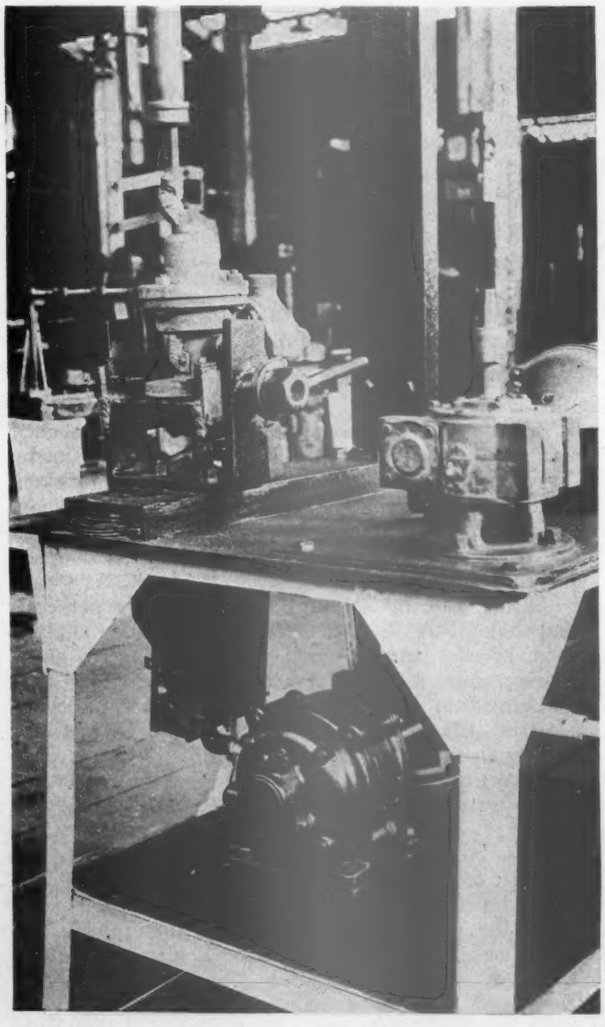
On June 23, 1929, the Atlanta, Birmingham & Coast applied a new temporary A. R. A. standard coupler with 5-in. by 5-in. shank and 12½-in. head to Seaboard Air Line car No. 82506, in place of a 5-in. by 5-in. by 9¼-in. coupler, on account of the butt being broken. The stenciling was changed by the A. B. & C. to show the 5-in. by 5-in. by 12¼-in. coupler as being standard to the car. A charge was made for the new coupler, credit being allowed for the defective A. R. A. standard 5-in. by 5-in. by 9¼-in. coupler. The owner contended that the A. B. & C. had no authority to apply a 12¼-in. coupler and to change the stenciling to show this size coupler as being standard to the car, and that this substitution constituted wrong repairs. Cancellation of the charge was requested because of the failure of the repairing line to issue a defect card at the time repairs were made. The Seaboard Air Line contended that Arbitration Decision 932 covered a parallel case and contended that the entire charge should be cancelled in accordance with Interpretation 4 of Rule 87. The A. B. & C. claimed that wrong repairs were not made, as Paragraph C of Rule 17 states that the dimensions of the shank and butt must be maintained, but does not mention the coupler head. It also pointed out that the car was stencilled only "5-in. by 5-in. shank coupler" and that the stenciling did not show the size of head standard to the car. It also claimed that Rule 88 permits the repairing line to use material from stock in order to expedite repairs to foreign equipment, in-

stead of ordering special material, not specified in the last paragraph of Rule 122, from the car owner. The A. B. & C. also claimed that if within the intent of the rule wrong repairs had been made the owner should have obtained a joint evidence in accordance with Rule 12 and corrected the wrong repairs within the time limit prescribed and requested a defect car from the repairing line.

The Arbitration Committee rendered the following decision: "The temporary M. C. B. standard coupler was designed for use of car owners until such time as permanent end clearance in certain types of construction could be provided. It was not intended for application to foreign cars unless so stenciled. Therefore, the substitution constituted wrong repairs. The contention of car owner is sustained."—*Case No. 1678, Seaboard Air Line vs. Atlanta, Birmingham & Coast.*

Handy Stripping Bench In Triple-Valve Shop

THE stripping bench shown in the illustration, while only 4 ft. square is sufficiently large to take care of the stripping of from 75 to 80 triple valves each eight hours, including the grinding in of the check-case seats.



Seventy-five triple valves can be stripped in eight hours on this bench

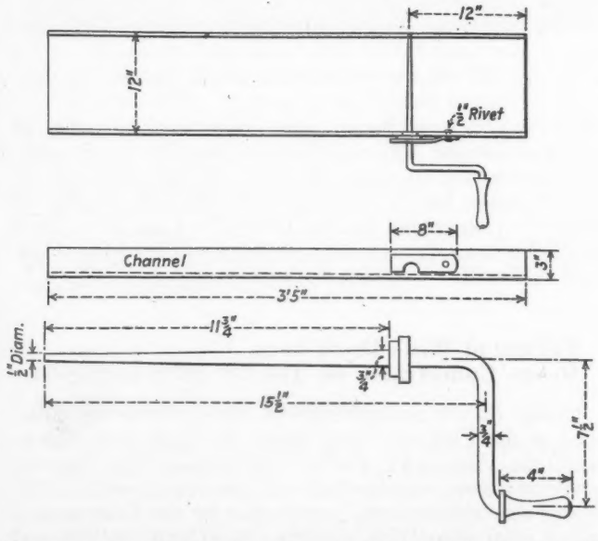
The triple valve is placed in the adjustable vise shown on the left side of the bench and all of the nuts are removed with a socket wrench equipped with toggle joints and located just over the vise. This wrench is electrically driven, and the speed is controlled by reduction gears. In addition to the toggle joints, which permit flexibility, a hollow tube or section of pipe is located just above the joints which allows the operator to raise or lower the socket wrench a distance of 12 in. Power for the operation of the wrench is controlled by a foot treadle permitting instantaneous starting or stopping.

At the right of the table is located an electrically driven grinder. Various sizes of grinding discs can be applied for grinding the seats of check cases at the same time that the operator is stripping the triple valve.

Device for Forming Back Rolls in Journal Boxes

REGARDLESS of the methods employed in the manufacture of back rolls for use in packing journal boxes the rolls must conform to the size as given in A. R. A. Rule 66. When rolls are spun on a spindle, Rule 66 permits the elimination of 3-ply jute, flax, or "mail" twine for tying the roll.

An ideal spindle for the manufacture of back rolls can be made as shown in the sketch. A section of 12 in. channel of any length desired can be used for the trough. A spindle ¾-in. in diameter and tapered down to ½-in. at the extreme end is inserted in the side of the channel about 12 in. from the end. This is held in place by a latch secured to the side of the channel which fits over the sleeve which is welded or forged 11¾ in., from the tapered end of the spindle. This latch is attached to the side of the channel with a ½-in. loose fitting rivet or bolt and permits the latch to be raised or lowered to apply or remove the spindle.



Drawing showing details of the tool for making back rolls

Back rolls can be formed on this device with either dry or saturated packing. If dry packing is used, the rolls must be soaked in car oil before they can be used.

However, saturated packing can be used just as efficiently and when rolls are thus formed they are ready for immediate use. If saturated packing is used it is recommended that a number of ⅜-in. holes be drilled through the bottom of the channel, directly under the spindle, to permit oil to drain into a receptacle, which should be placed under it for that purpose.

Floor Furnace And Nozzle Valve

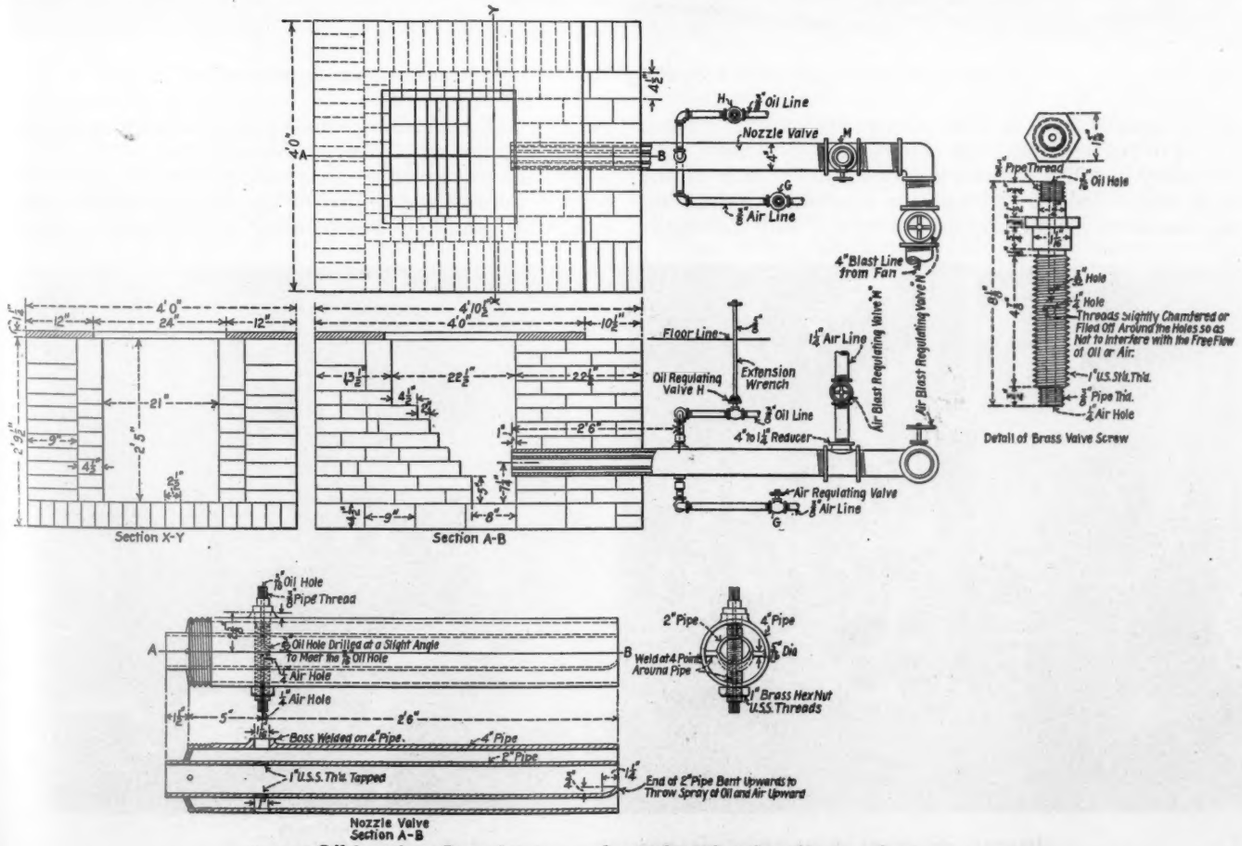
THE oil-burning floor furnace and nozzle valve shown in the drawing is used in the forge shop of the car department of an eastern road. The piping is laid in a trench which is covered with an iron grating or with planks. Extension wrenches, such as that applied to the oil-regulating valve *H*, are attached to all valves located in a trench for convenience of operation. Valves *G* and *H* regulate the supply of air and fuel oil, respectively. The valve *N*, in the 4-in. blast line, regulates the blast from the fan.

The nozzle consists of 4-in. and 2-in. pipe, the smaller pipe being placed inside the larger, as shown. The 2-in. pipe is held in position by four welded ribs at the threaded end as shown in section *A-B*. The welded ribs are approximately 5/16 in. in diameter and are equally spaced around the pipe.

The nozzle valve is used on practically all of the oil-burning furnaces installed in the car shops on the railroad, and can be applied to nozzle pipe of various size by changing the valve dimensions to suit. The threads of the valve screw are slightly chamfered or filed off around the holes so as not to interfere with the free flow of oil or air. Oil is forced through a 3/32-in. hole from the top of the valve and air enters the nozzle through a ¼-in. hole from the bottom end. The oil and air are thoroughly mixed by the action of the air from the blast fan.

It will be noted that the lower end of the 2-in. nozzle pipe is bent upward to deflect the spray of oil and air upward against the bricks which are built in a series of steps to further assist the upward deflection. The furnace is constructed with Munro 9-in. by 4½-in. by 2½-in. firebrick. The top of the furnace is protected by a ¼-in. plate, as shown, to prevent damage to bricks when work is laid on top of the furnace to be heated.

AN ARTICULATED LOCOMOTIVE CONTEST.—In a recently published volume entitled "Articulated Locomotives," Professor Lionel Wiener describes a contest held at Semmering (Austria) in 1851 to determine which of the articulated locomotive systems then available would be likely to give the greatest satisfaction under the very difficult conditions prevailing on the Semmering Railway. The conditions to be met were that the locomotive should be able to draw trains of 140 tons up a grade of 2½ per cent at a speed of 7½ miles an hour. The boiler pressure was not to exceed 121 lb. per sq. in. and the axle load was limited to less than 14 tons. On one section of a little more than 23 miles, grade reaching 2½ per cent were encountered, one of them having a length of 1½ miles. The minimum radius of curvature was 623 ft., except on the grades, where it was 935 ft. In 1850 the Austrian Ministry of Commerce and Public Works issued an invitation for designs of locomotives capable of dealing with the traffic on the section, and a monetary prize was offered for the best locomotive performance. This prize amounting to 240,000 francs, was awarded to the locomotive bearing the name *Bavaria*, built by Maffei of Munich. This engine was equipped with three trucks or groups of wheels, and transmission was effected by chains. Its weight in working order was 68.3 tons.—Railway Gazette.

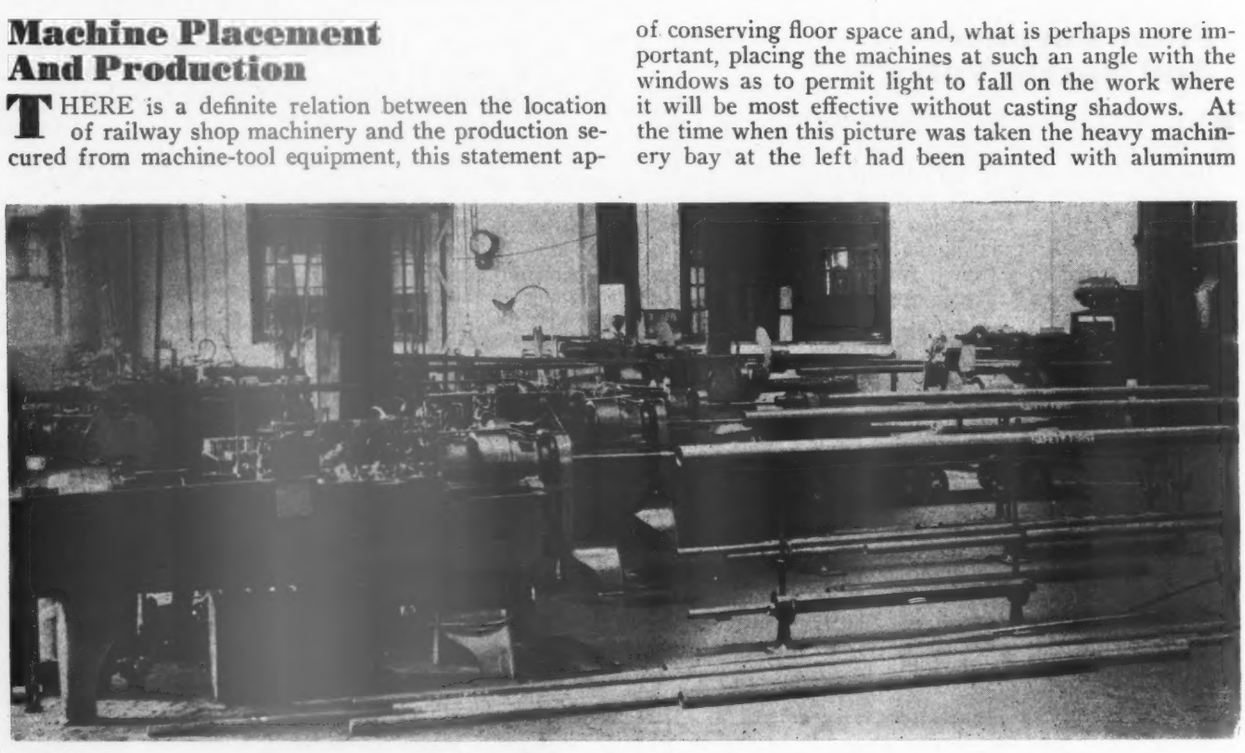

Oil Line
Nozzle Valve
Air Line
4" Blast Line from Fan
Floor Line
Extension Wrench
Oil Regulating Valve H
1½" Air Line
Air Blast Regulating Valve N
Oil Line
4" to 1¼" Reducer
Air Regulating Valve
Air Line
Section X-Y
Section A-B
Pipe Thread
Oil Hole
Hole
Threads Slightly Chamfered or Filed Off Around the Holes so as Not to Interfere with the Free Flow of Oil or Air.
1" U.S.Std.Thds.
Pipe Thds.
Air Hole
Detail of Brass Valve Screw
Oil Hole
Pipe Thread
Oil Hole Drilled at a Slight Angle To Meet the ⅛" Oil Hole
Air Hole
Boss Welded on 4" Pipe.
4" Pipe
2" Pipe
1" U.S.S. Thds. Tapped
End of 2" Pipe Bent Upwards to Throw Spray of Oil and Air Upward
Weld at 4 Points Around Pipe
1" Brass Hex Nut U.S.S. Threads
Nozzle Valve Section A-B

Oil-burning floor furnace and nozzle valve for the car shop

In the Back Shop and Enginehouse

Machine Placement And Production

THERE is a definite relation between the location of railway shop machinery and the production secured from machine-tool equipment, this statement applying equally well in almost any department. Take, for example, the small machinery bay illustrated. As originally installed, all machinery in this section of the shop was placed parallel with the windows. Relocating the machines diagonally, as illustrated, had the result of conserving floor space and, what is perhaps more important, placing the machines at such an angle with the windows as to permit light to fall on the work where it will be most effective without casting shadows. At the time when this picture was taken the heavy machinery bay at the left had been painted with aluminum paint, greatly improving the lighting conditions in the interior of the shop. When this treatment with aluminum paint was given to the posts, steel beams and supporting timbers and ceiling of the small machinery bay a lighting condition was obtained which approximated



A battery of turret lathes in a carefully laid out bolt-manu facturing department

Diagonal placement of machines conserves floor space and gives correct light angle

a northern lighting effect without glare. Accuracy, safety, and increased production are attributed to the improved lighting conditions which resulted.

Similar treatment was given to the turret-lathe equipment in the southeast corner of the same shop. This machinery includes turret lathes and an automatic stud machine, etc., set diagonally in this case not only to conserve space, but to permit handling full length stock and to centralize supervision. As a result of the improved lighting conditions and better supervision, the production in this department of the locomotive shop was increased substantially and unit costs proportionately reduced. While the actual production secured varies somewhat and depends upon demand, an average time for some of the most commonly used parts manufactured on a production basis is as follows: Cylinder head studs, 3 min. each; boiler studs, 4 min. each; taper-head radial staybolts, 3 min. each. In addition, guide bolts, studs, special pins and frame bolts are roughed out and semi-finished at a highly desirable production rate as compared to that in inadequately-equipped and poorly-lighted bolt departments.

The cab safety platform and ladder supporting five men

A Cab Safety Platform

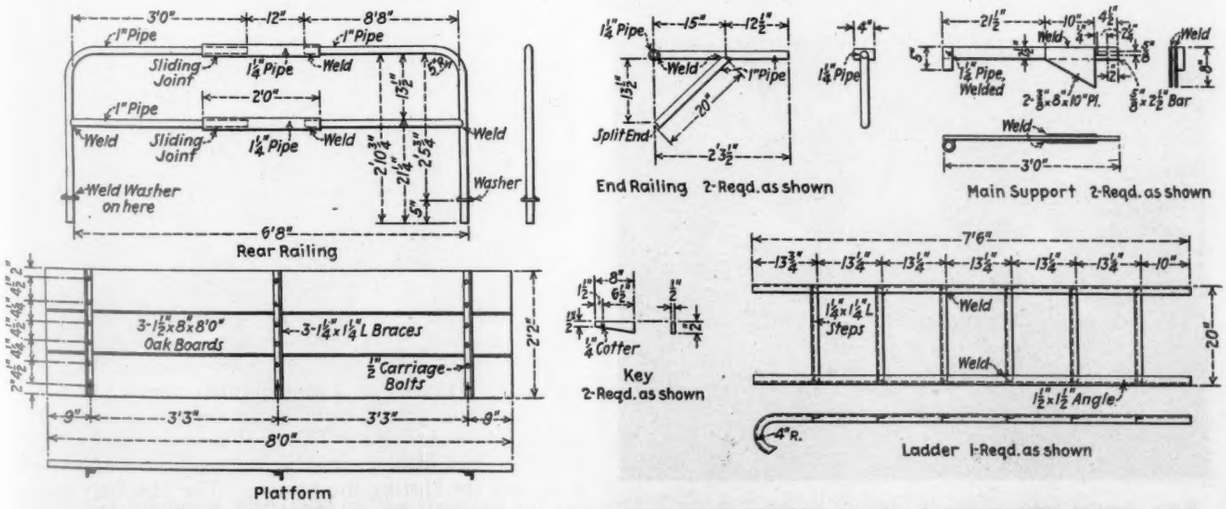
A CAB safety platform, notable for light weight and strength, as well as ease of application, has been developed at the Terre Haute (Ind.) enginehouse of the Chicago, Milwaukee, St. Paul & Pacific. This platform is of welded tubular steel construction, designed to be firmly attached to the cab of a locomotive undergoing repairs in a back shop or enginehouse after removal of the tender. It affords an easy and safe entrance to the cab, also making more working space available at the level of the cab floor.

The general construction and details of the platform are shown in the illustrations. Referring to the assembly drawing, it will be observed that the platform and cab rails are carried on two horizontal main supports of 5/8-in. by 2½-in. steel, which extend through the cab waste sheet and are secured on the inner side by taper keys. The platform itself consists of three oak boards, 1½ in. by 8 in. by 8 ft., held together by 1¼-in. angle-iron cross braces and carriage bolts. The outer angle irons are located just inside the horizontal supports so as to prevent undesirable end movement of the platform.

The outer ends of the main platform supports carry two vertical 1¼-in. by 5-in. pipe nipples, welded in place, which receive and support the vertical members of the double-bar rear railing. This rear guard railing is made of 1-in. pipe, bent and welded together. Suitable washers, welded in place, serve to prevent the vertical members of the rear railing from dropping more than 5 in. into the 1¼-in. main support nipples. Sliding joints are provided at the center of the double-bar rear railing by means of two long 1¼-in. pipe nipples, welded at one end. An end railing, provided on one or both sides of the platform, as desired, consists simply of a piece of 1-in. pipe, welded to a 1¼-in. by 5-in. pipe nipple, moving freely on the upper bar, with a diagonal pipe brace bearing on the lower bar. The end railing can be readily swung back out of the way when not needed on the side on which the ladder is being used.

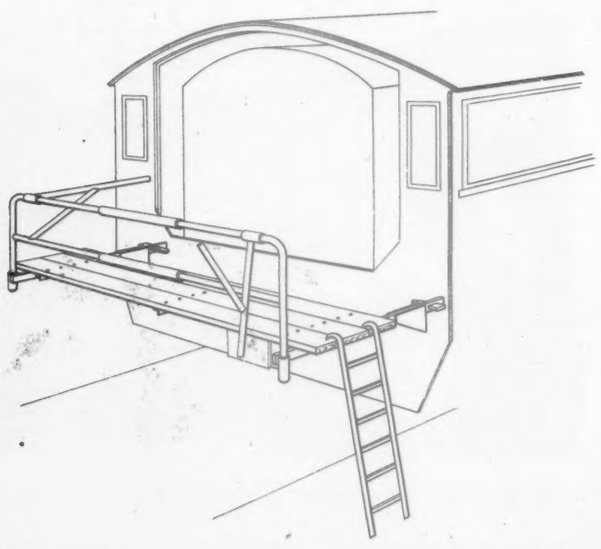
The ladder consists of welded angle-iron construction, which is light in weight and rigid. The ladder sides are bent at the top in the form of a half circle to hook over the platform. The ladder simply rests against the platform and serves in no way to support it.

This safety platform is constructed from second-hand material at small cost. It comprises essentially two main supports, a platform, a ladder, and rear and



Details of cab safety platform developed at the Terre Haute (Ind.) enginehouse of the Milwaukee

end guard railings in two pieces, any one of which can be readily handled by one man. Owing to this construction, which makes all parts relatively light in



General arrangement of light but strong cab safety platform

weight, one man can apply or remove the safety platform readily without assistance except possibly in lifting the platform into place.

Attachment for Cutting Oil Grooves in Bushings

WITH the demand for more efficient lubrication of moving parts on present-day locomotives, it becomes necessary to develop a better method of grooving motion work and rod bushings. A practical device which has been in use at Silvis (Ill.) shops of the Chicago, Rock Island & Pacific for some time was designed and applied by J. C. H. Pauls, foreman.

The old method of lubricating a bushing was to drill a hole through the bushing at the top center. On the smaller bushings, this was the only provision made, while on the larger ones a groove was chipped each way from the hole and in a straight line along the bore of the bushing. In many cases, the lubricant did not travel to the outer edges, and the result was that only the center portion of the pin was lubricated. This caused excessive wear and in some cases caused failure and increased loss in maintenance.

With the improved method, these difficulties have been overcome, resulting in a saving of both material and time. The present groove is shaped like a figure eight. The oil hole is drilled at the intersection of the two circular grooves. The one circular groove starts at the top and center and advances to the outer edge as it continues to the bottom of the bushing, and as it comes to the top on the reverse side it intersects at the oil hole and continues the second circle on the opposite side in the same manner. When the lubricant enters through the oil hole at the intersection of the two circular grooves, it meets with no resistance as the grooves follow a downward path advancing to the outer edges of the bushing. This feature assures more satisfactory lubrication as it distributes the lubricant over the entire length of the pin. The grooves vary in size from ⅛ in. to ½ in. in width, and from 1/32 in. to ⅛ in. in depth, according to the size of the bushing. This method of grooving is used both on brass and steel bushings. Grooves can be machined on either the inside or outside of the bushing.

End gearing used to give the proper pitman and carriage movement

Rear view of lathe equipped with oil-grooving attachment

This attachment was designed as a separate unit so that it can be disengaged easily, and the engine lathe to which it is attached can be used for its regular line of work. The 32-tooth spindle gear remained intact; next a 64-tooth change gear was selected and a 32-tooth mitre gear which was mounted and keyed to the changed-gear shaft. To engage another 22-tooth mitre gear and at right angles to the spindle, a bearing was applied to the end of the lathe and toward the rear of the machine. In this bearing, the crank is mounted, having the second mitre gear on one end and a 14-in. disc on the other end which acts as a crank. The disc end of the crank has a 6-in. slot extending from the center toward the outer edge in which a step body bolt is inserted to provide for adjustment. The motion from this crank is transmitted to the carriage by means of a long pitman which has a series of holes in the carriage end and slips over a pin at the rear of the carriage. The tool post is equipped with a boring-bar holder, and a bar with a single round-nose tool for cutting the groove. The bushings are held in a universal 3-jaw chuck.

When operating the lathe, the bushing makes two revolutions as against one movement of the carriage holding the tool, forward and back. This is controlled by the 2-to-1 ratio of the spindle and change gear, while the amount of the carriage travel is controlled by the adjustment of the crank, by means of the slot. The crank end of the Pitman is set off center slightly less than one-half the width of the bushing so that the grooves will come near the outer edge at the bottom of the bushing.

The time required to do this grooving operation varies from two to four minutes, depending on the size of the bushing and the depth of the groove. With this nominal expense involved for grooving, a more efficient system of lubrication has resulted with a great saving in maintenance costs.

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Mechanical Lubricator Filler

PARTICULAR attention is paid at the Illinois Central enginehouse, Centralia, Ill., to provide, as far as possible, every assistance and mechanical facility required for the expeditious turning of power and conditioning it for further service. All of the operations on the receiving and delivery tracks have been studied and the work organized to eliminate lost motion as far as possible. One of the details receiving special attention is the supply of oil to flange lubricators and mechanical lubricators. As soon as a locomotive is received at the Centralia terminal and placed on the cinder pit for fire cleaning, the flange oiler is filled quickly with a supply of clean oil under air pressure from a tank in a small building nearby where the temperature can be controlled in cold weather. The oil is piped directly to the cinder pit where a small flexible hose and bent pipe nozzle permit filling the flange oiler without the necessity of the man who attends to this work leaving the ground.

Mechanical lubricator filler used at the Centralia (Ill.) Enginehouse of the Illinois Central

More or less similar advantages are obtained by the use of the mechanical lubricator filler shown in the illustration. This device consists of a small tank mounted on two wheels and provided with a double-bar handle, electrically welded in place, for easy movement of the apparatus. The tank is provided with filling and drain plugs, also welded by the electric process, and a small hand pump which can be used to fill the mechanical lubricator without the necessity of the operator leaving the ground. Owing to the location of the mechanical lubricator usually in a restricted space under the running board, any attempt to fill it with the ordinary oil-can involves considerable climbing, physical effort and loss of time on the part of the oiler, to say nothing of expensive oil which may be wasted. The advantages of the equipment illustrated for the easy and efficient filling of mechanical lubricators will be readily apparent.

Portable Pipe Racks

THE handling of air and steam pipes removed from locomotives at the stripping tracks in shops presents a serious problem unless some systematic arrangement is in effect for segregating those removed from each individual engine and placing them in a designated place so that they will not get mixed with pipe removed from other engines of different classes.

The pipes from each locomotive are stored on a separate portable rack

To overcome this difficulty an arrangement was perfected by a stripping foreman at a locomotive back shop on an eastern railroad whereby all pipe, when removed from the engine, is placed in a portable container and stored in a designated location until required.

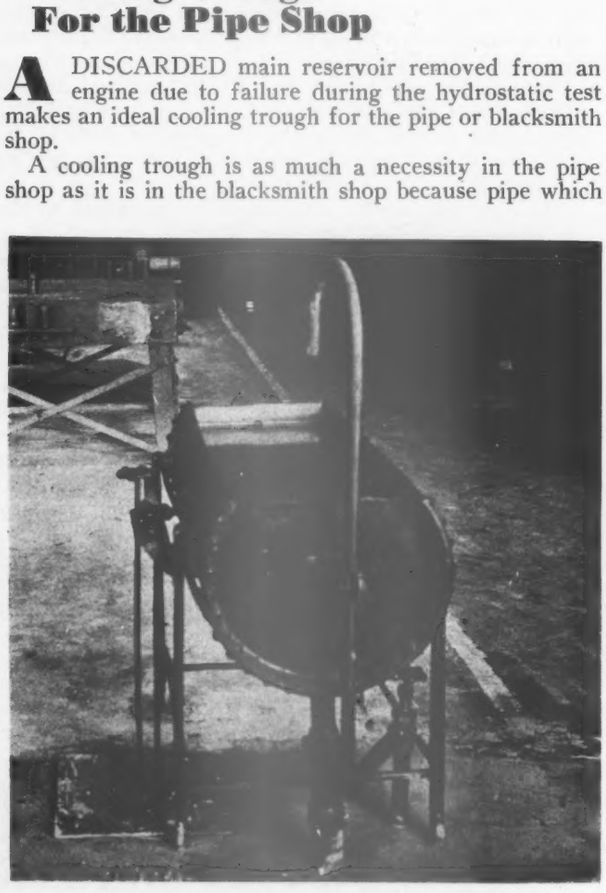
This container, as shown in the illustration, is mounted

on four cast-iron wheels and can either be pulled by a motor tractor or lifted by overhead crane to the storage platform or to the engine for application.

Cooling Trough For the Pipe Shop

A DISCARDED main reservoir removed from an engine due to failure during the hydrostatic test makes an ideal cooling trough for the pipe or blacksmith shop.

A cooling trough is as much a necessity in the pipe shop as it is in the blacksmith shop because pipe which



A cooling trough made from an old main reservoir

is heated and bent into various shapes or forms is ordinarily required for immediate use on the engine and should be cooled before it is handled by the workmen to prevent personal injury from burns.

By cutting the reservoir, as shown in the illustration, sufficient depth is available to permit immersion of the average pipe bend used in the enginehouse or back shop. A water pipe and drain can be applied directly to the trough, effecting a continuous supply of cold water at all times.

Rack for Testing Main Reservoirs

MAIN reservoirs after being removed from engines going through the shop for classified repairs must be hammer tested and receive a hydrostatic test before they are reapplied.

This work can be greatly simplified by the installation of a rack similar to that shown in the illustration. It is so constructed that the workman may perform his duties without bending over and a drain at the center of the rack eliminates a water-soaked floor.

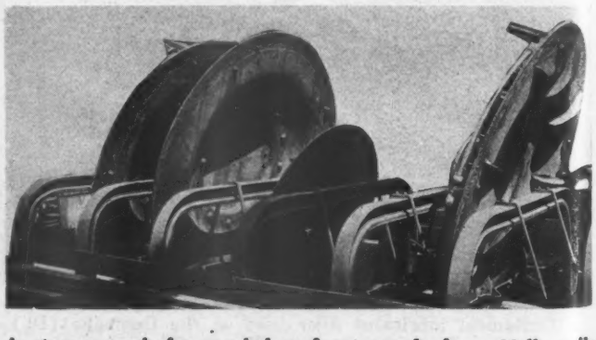
The rack is constructed of iron or steel and can be either riveted or welded together. It is 36 in. in length, 2 ft. wide and 2 ft. high to the top of the cradles. A roller on each side of each of the three cradles, so

A rack of this type permits thorough inspection during hydrostatic testing

located that the reservoir rests on them when placed on the rack, permits the workman to turn the reservoir with little effort for the hammer test.

Front-End Storage Rack

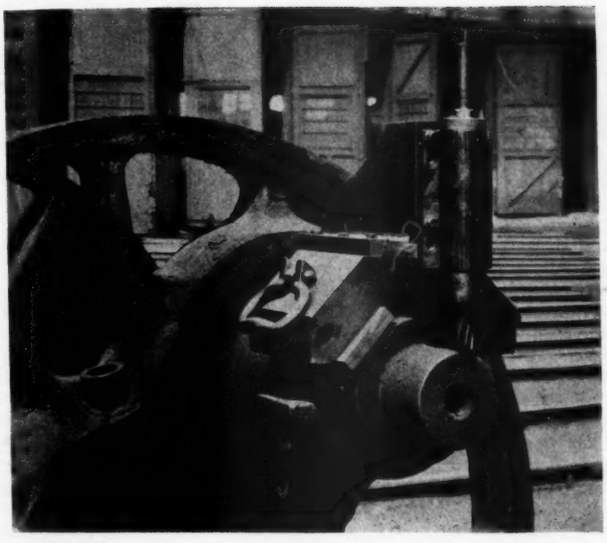
IN many locomotive shops it is not uncommon to find smokebox fronts leaning against the sides of buildings or thrown in piles at the first convenient location by the stripping gang. In other shops cars are provided on which the fronts are placed until needed, at which time the car is switched into the shop and the front replaced on the engine.



A storage rack for smokebox fronts made from 90-lb. rails

The rack for the storage of front ends as shown in the illustration was designed by the general foreman of a shop that formerly used the car handling system, which was found to be unsatisfactory because it was not always possible to have the car spotted under the overhead crane when the front end was needed. However the rack, which should be located in close proximity to the overhead cranes, not only presents a neat appearance, but also makes it easy to secure the front end when needed.

While ordinary 1½-in. by 6-in. bar iron can be used in manufacturing this rack, the one shown was made from discarded 90-lb. rails which were heated and formed 5 ft. from each end and welded to a bed plate. A ¼-in. by 4-in. strap of the desired length is welded on each side of the rails a distance of 4 ft. from the bottom which makes the rack sufficiently rigid to support the weight of the front ends. Cradles made from ½-in. by 2-in. wrought iron can be attached to the rails for supporting the fronts, and preventing contact with the bed plate but are not necessary if a soft-wood platform is provided to prevent damage to the edges.



Eccentric keyway miller which saves time at the Illinois Central enginehouse, Centralia, Ill.

Keyway Miller

THE usual practice is to mill the eccentric keyways in crank pins before the pins are assembled in the wheel centers, and this permits doing the job on a shop machine of the proper size to assure accuracy and minimum time required for the operation.

Where assembled driving wheels, axles and crank pins are shipped from the main locomotive backshop to a smaller shop or engine terminal at some intermediate repair point, eccentric keyways must be made after application of the crank pins, or have recourse to the objectionable offset keys. Chipping and filing a keyway of any kind in steel by hand methods is generally undesirable, both from the point of view of accuracy and time required, and the eccentric keyway miller, shown in the illustrations, has, therefore been made at the Centralia (Ill.) enginehouse of the Illinois Central to conserve time and labor in cutting these keyways.

The eccentric keyway miller consists simply of a substantial V-block, resting on the journal and firmly clamped in place by means of a heavy strap and two bolts. The end mill, supported in a ball-bearing spindle and driven by an air motor, is capable of adjustment vertically to give the required depth of cut by means of slots in the tool head and four cap screws. Feed lengthwise of the journal is secured by means of a hand screw (not visible) which operates the right-angle bracket, carrying the tool head, in suitable V-ways. Convenient handles facilitate moving and adjusting the eccentric keyway miller on the crank pin.

* * *

Test train equipped with the Transit air brake—These tests were made under the supervision of the inventor and the air-brake manufacturers on several privately owned railroads in Sweden—A description of the Transit brake and a report of the tests were published in the May, 1930, *Railway Mechanical Engineer*

NEW DEVICES

York Air-Conditioning Equipment for Passenger Cars

Thirty-six of the 38 air-conditioned cars now operated by the Baltimore & Ohio employ a system of air-conditioning which receives its power from three different types of units mounted under the car, such as a gas-engine generator set direct-mechanical drive set, and body-hung axle generator set, thus allowing for free interchange of equipment. These cars are used to make up two complete trains operating between New York and Washington, D. C., and to provide air-conditioned parlor cars between these points on a train running between New York and St. Louis, Mo. The three trains are, respectively, the "Columbian", the "New York-Washington Express", and the "New York-Cincinnati-St. Louis Express". The Columbian was placed in service on May 24, 1931, and during the past summer the improved service has served greatly to increase the amount of passenger travel on these trains. The 36 cars have equipment furnished by the York Ice Machinery Corporation, York, Pa.

The York system of air-conditioning is designed in individual car units to provide flexibility of operation with respect to the handling of the cars in trains and in terminals. The cycle of refrigeration is closed and occurs outside the space occupied by passengers.

Referring to the drawing showing the location of the equipment on the car, air is drawn from the passenger compartments through an air-conditioning unit which is installed over the passageway to the vestibule. This unit may be installed as a vertical floor-type unit in a locker within the car. It is constructed of galvanized iron and contains, in addition to the pipe coils for circulating the brine, a surge drum and the complete fan assembly for circulating the air within the car. The fan is driven by a V-belt from a 32-volt motor of approximately 1 hp.

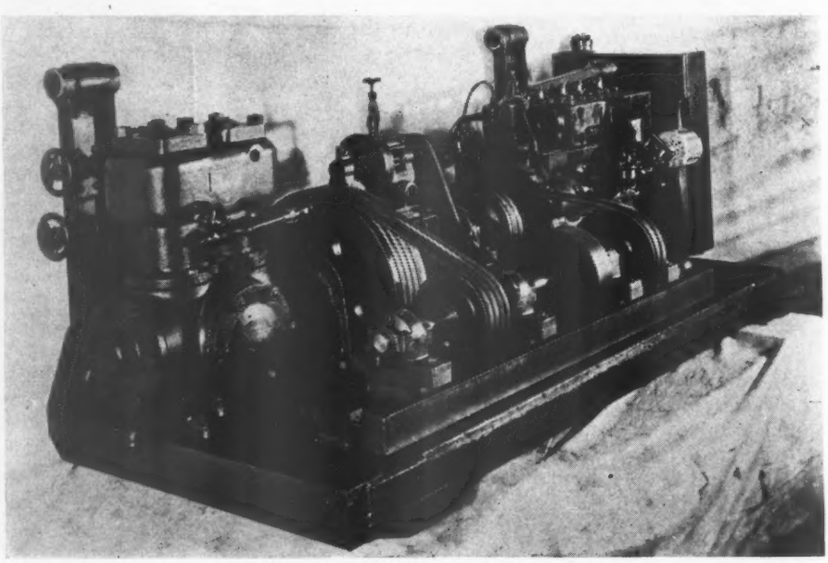
The brine which circulates through the air-conditioning unit is forced through a cooler by means of a pump. The location of the brine pump and cooler in the brine circuit through the air-conditioning unit is indicated in the drawing showing the cycle of operation for the system. The pump is of rotary design and is driven by a V-belt connected to the shaft of the gas engine on the direct mechanical-drive unit. The brine cooler is a closed, insulated shell, 6 ft. 5¾ in. long by 12¾ in. in outside diameter, and contains the coils through which the brine from the air-conditioning unit is circulated. It is supported underneath the car and is provided with an oil drain for removing any oil which may get into the refrigerating system.

A liquid refrigerant is fed to this cooler, the rate of flow of which is automatically regulated and controlled by a float regulator. As the refrigerant vaporizes under reduced pressure, it cools the secondary liquid (the brine in the air-conditioning-unit circuit) and is returned in the form of vapor to the compressor.

The compressor has a capacity of approximately four tons. On the direct mechanical-drive set, it is assembled together with a marine-type gasoline engine, water-circulating pump and brine-circulating pump, and mounted on a structural-steel base which is supported underneath the car by means of rubber-cushioned hangers secured to the underframe.

The refrigerant vapor is compressed and discharged into the condensing, or liquifying coils in the cooling tower, where it is cooled by a spray of water, converted to liquid and again circulated via a float regulator through the liquid cooler.

The water used for liquifying the refrigerant in the condensing coils is kept cool by the evaporative effect of the air forced through the cooling tower. Thus, the heat absorbed by the water spray from the refrigerant is discharged from the cooling tower to the outside atmosphere



Engine-compressor unit as it is assembled for mounting on the car

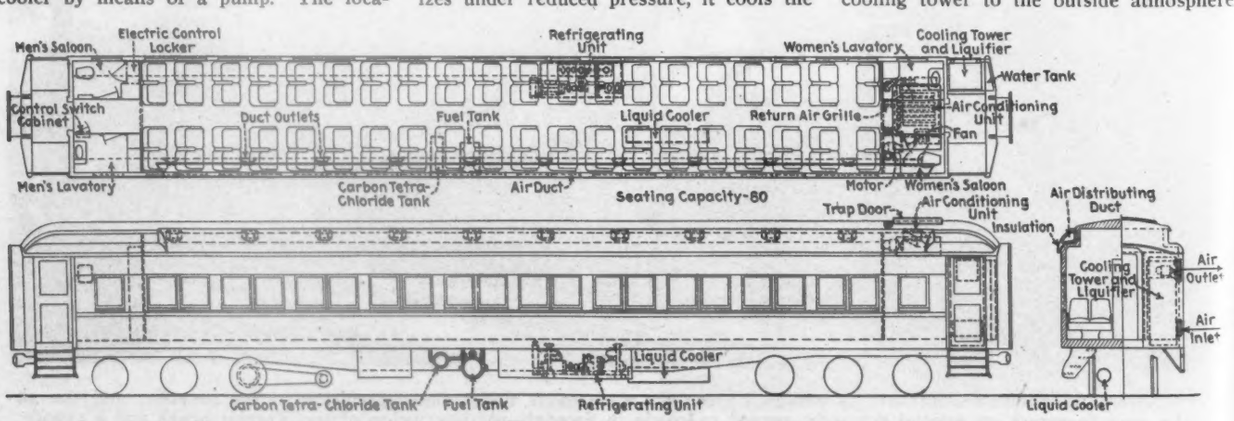
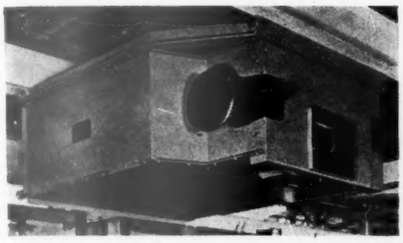


Diagram showing the location and arrangement of the air-conditioning equipment on the car

by the current of air which is sucked in at the bottom of the tower and discharged at the top by means of a fan driven by a 32-volt ½-hp. motor.

In the case of the Baltimore & Ohio installations, the cooling tower and tank for make-up water are located in one side of a vestibule. The water-spray chamber is of heavy galvanized sheet steel. The spray piping is provided with bronze nozzles designed to produce a series of sheets of mist across the path of the air

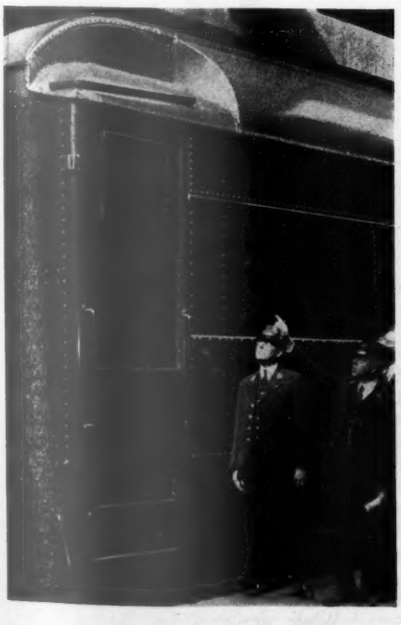


York air-cooling unit before installation at top of cars

and also to give the proper impingement against the refrigerant coils. Eliminators are provided at the top of the spray chamber to entrain the moisture from the air and return this water to the spray chamber and settling pan.

This pan is located in the bottom portion of the tower and is kept at a constant water level by means of an automatic float which regulates the supply of water from the make-up tank. Slosh plates, strainers, access doors and other auxiliary equipment are included in the equipment furnished with the cooling tower.

The liquid refrigerant is then pumped from the coils in the cooling tower through a float regulator to the brine cooler, as shown in the diagram of the cycle of operation. Thence it flows to



Appearance of the cooling tower from outside the car

the compressor, thus completing the cycle.

The gasoline engine on the direct mechanical-drive unit operates at slow speed and is connected to the compressor through a countershaft with over-running clutch by means of a V-type belt. This drive arrangement was adopted to avoid vibration and to permit the engine to start under no load. The countershaft is made adjustable to suit the drive. The brine and water-circulating pumps are also driven from the shaft of the engine to assure that these units are in operation at all times when the power plant is operating.

The engine is started by means of an electric-motor starter which is thermostatiscally controlled. It is also controlled by an automatic governor to maintain constant speed. Various safety and protective devices, such as high and low-pressure cut-outs, gages and other accessories, are provided to form a complete

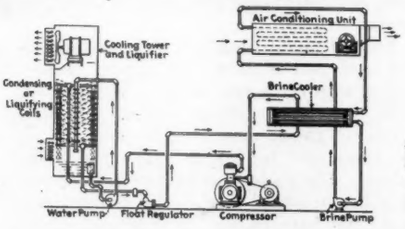
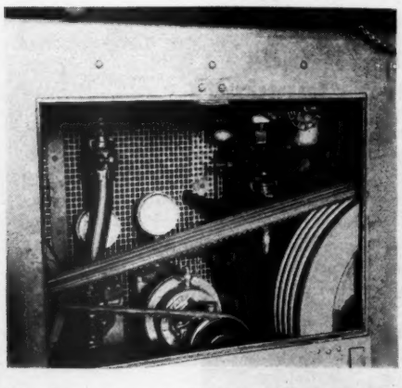


Diagram showing the cycle of operation

compressor-power unit, as shown in one of the illustrations. This unit, which is mounted on a platform suspended beneath the car, is enclosed in a ventilated steel casing. In case of fire, the gasoline supply tank is protected by means of a tank of carbon tetra-chloride which is connected to the fuel supply in such a manner as automatically to dilute the gasoline and make it uninflammable.

The electrical control panel, which is designed to be installed in a space approximately the size of a car-lighting panel, permits the operation of the air-conditioning equipment by push-button



Close-up view of York air-conditioning unit located beneath each car—It is readily accessible by opening the folding door of the steel compartment housing it

control. The location of a small push-button control cabinet containing the "stop", "start" and "run" push buttons is designed for easy access. A selector switch is also provided so that the air-conditioning fan may be operated without refrigeration for spring and fall use.

The air is distributed through the car by means of a duct which is located on one side of the car only, so that the ventilators on the opposite side may be opened in the usual manner in case the air-conditioning equipment is not in operation.

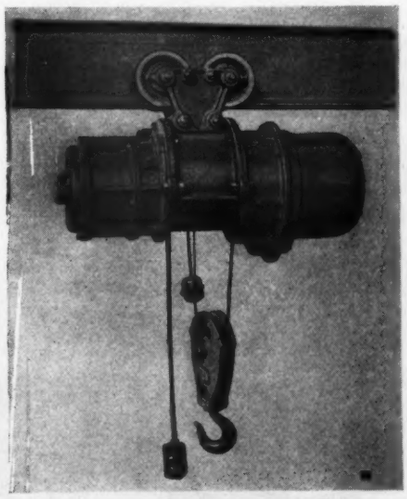
The air discharged from the air-conditioning unit is carried into the duct through special connections and deflectors. Thermostat control regulates the proper temperature of air to be discharged from each of the outlets in the car. The outlets, together with a system of deflectors, are arranged so there are no undesirable drafts.

The air discharges near the ceiling of the car at slow velocity and in such a manner as to mix with the air in the car by gradually descending at a uniform rate through the passenger space. The air is returned to the air-conditioning unit through the return-air grille.

The air-conditioning equipment weighs approximately 9,500 lb. The cooling equipment described above is subject to patents pending by the Baltimore & Ohio.

Wright Electric Trolley Hoists

The Wright Manufacturing Company, Bridgeport, Conn., has recently developed a new line of electric trolley hoists consisting of plain, geared and motor



The trolley-wheel bearings take up both radial and thrust loads

driven trolley types. The bearings of the trolley wheels are designed to absorb both radial and thrust loads, thus reducing the effort required to move the trolley along the I-beam to a minimum.

The trolleys come in plain, geared and motor-driven patterns. In the motor-driven trolleys, the wheels are driven on each side of the I-beam, insuring smooth operation, and are equipped with a safety stop. Controllers for a single speed, two speeds, or variable speeds

can be furnished. The hoists can be mounted either parallel or at right angles to the runway beam. While the standard lift is 18 ft., lifts of 9 and 36 ft. can be furnished. Features of the hoist include full size drums for long cable life, push-button or pendant-rope control, Tru-Lay preformed cable, safety type limit switch, positive braking and weather-proof motors.

Thompson Hydraulic Surface Grinder

The Thompson Grinder Company, Springfield, Ohio, has just placed on the market a surface grinding machine for rapid production on flat surfaces. The new grinder is fully hydraulic in operation. The table of the machine is reciprocated under the wheel in one direction only—the grinding head being traversed across the work. The table is actuated by a hydraulic cylinder and may be reversed either by table dogs or manually at any point in its stroke. The wheel head is traversed hydraulically at both ends of the table reverse and is controlled by a valve which is instantly variable and reversible. A grinding wheel 10 in. in diameter by 3 in. wide is standard equipment and is mounted on a chrome-nickel spindle revolving in scraped, adjustable bronze bearings at both the front and the rear. The end thrust is taken by a hardened thrust collar on the spindle. A balanced rotor is keyed directly to the spindle tending to eliminate vibrations induced by indirect drives.

Front view of the Thompson grinder showing the accessibility of controls

The cross feed to the head is hydraulic and automatic, acting at both ends of the stroke. Feeds may be obtained from 1/32 in. to 2 in. for each reverse, thus permitting rapid removal of stock at high speeds. The work head may be raised or lowered by means of a convenient hand wheel in the carriage. A micrometer index permits increments of .00025 in. to be obtained.

The oil pump for the table is located in the base and is driven by a 3-hp. motor belted with a vee-type drive. A generator with sufficient capacity for a full size magnetic chuck may also be mounted in the base and be driven from the 3-hp. motor. The entire mechanism is mounted on a heavy ribbed base, which is insulated from the base of the machine by vibration-absorbing material. The motors for the grinding head and table drive are controlled separately by push buttons and protected by overload relays.

All controls are located at the front of the machine. The table has an infinite speed range from 20 ft. to 100 ft. per min. The table is provided with ½-in. standard tee slots for mounting a magnetic chuck or work. Suitable splash guards are bolted to the table as the machine is primarily intended for wet grinding. The coolant tank is located outside of the machine at the rear and is mounted on wheels to facilitate cleaning or refilling. The interior of the base is ventilated by a fan mounted on the pump motor to insure an even temperature in the base.

Three-quarter rear view of the machine showing the portable coolant tank

Die Heads Self-Opening

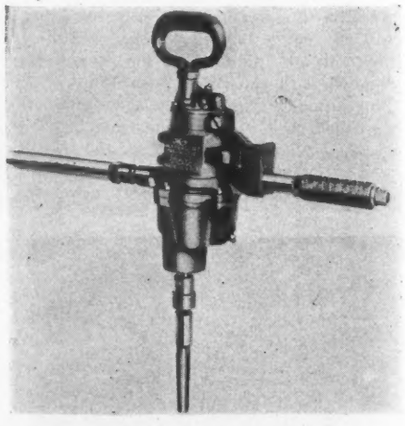
A self opening die head has been developed by the Eastern Machine Screw Corporation, New Haven, Conn., by means of which regrinding and sharpening are not necessary. Instead of using large chasers of high-speed steel, carriers have been substituted that take small high-speed inserts which are held in place by a single screw that has a draw-in feature which locks the insert back in the carrier so as to insure trackage and uniform distribution of the cut.

The carriers for any die head size are made to take inserts for a definite diameter range such as ¼ in. to ½ in., ½ in. to ¾ in. and the third size taking ¾ in. to 1 in. The same carriers are used for both the coarse- and fine-pitch series since the correct helix angle is in the chasers. This makes it unnecessary to have a different set of carriers for each different thread. The carriers themselves are larger than is usually the case and hence have nearly twice as much wearing surface where they slide in the carrier slots in the body of the die head. A set of chaser inserts for cutting threads of any given size can be used in any die head of this type.

Owing to the fact that regrinding is not a consideration in these die heads the insert type of chaser can be so made that its initial bearing clearances and cutting action are in correct balance for the extreme thread accuracies now required. When the insert chasers have been run to a point where threads no longer meet requirements a new set of chasers may be inserted in a few moments and no adjustment is required for the length of the thread. When changing chasers it is not necessary to screw a gage in the die head to adjust for size as almost no diameter adjustment is necessary even when shifting to a different thread size. The chasers may be removed at the machine without removing the carriers or the carriers and inserts may be removed entirely from the machine.

Air Tool for Tapping and Re-Tapping

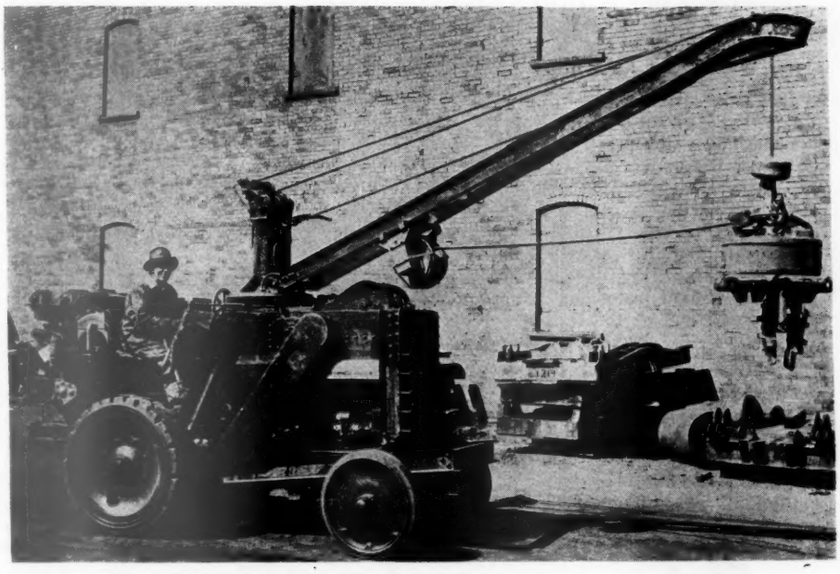
The Independent Pneumatic Tool Company, 600 West Jackson boulevard, Chicago, has designed a rotary pneumatic drill especially for tapping and re-tapping stud holes, etc., on locomotive boilers.



Thor No. 254R rotary air drill for tapping and nut setting

This tool is constructed on the rotary air principle and is known as the Thor 254R. Tapping and re-tapping stud holes on boilers was formerly performed by hand labor and proved to be a slow, tiresome job. The Thor 254R is capable of tapping new holes up to and including 1 in. and re-tapping holes up to and including 1⅛ in. It can also be used for tapping new threads in cylinder-head castings on locomotives.

The light weight of this tool enables one man to handle it without any assistance. While designed for tapping, the 254R can also be used for putting on and taking off nuts, cap screws, etc.



The Loadmaster handling castings with a magnet

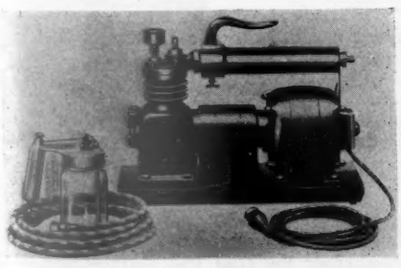
Loadmaster Equipped With Electro Magnet

The Loadmaster, manufactured by Bucyrus-Erie Company, South Milwaukee, Wis., and mounted on either wheels or crawlers, may now be obtained equipped with a 20-in. Ohio magnet. This magnet equipment facilitates handling scrap iron and small castings which ordinarily require considerable time for hooking. The Loadmaster has a fully revolving boom and can be used as a tractor, as a crane or can lift and travel with its load. Power is supplied to the magnet by a 2-kw. Kohler electric plant, mounted on the truck frame of the crane.

DeVilbiss Portable Spraying Outfit

An improved small portable spray-painting outfit, easily operated and carried by one person, has recently been developed by the DeVilbiss Company, Toledo, Ohio.

This low priced outfit, known as the DeVilbiss NC-607, is recommended for use by painters, decorators, contractors, builders and others as supplemental equipment for touch-up work on small sized painting or refinishing jobs. The NC-607 is a unit designed for small maintenance painting in hotels, buildings, and for refinishing furniture, store, office and home equipment. It is electrically driven and operates economically on any light socket. The compressor and motor are compactly and securely mounted on a rubber-footed metal base.



The DeVilbiss NC-607 outfit is easily handled by one man

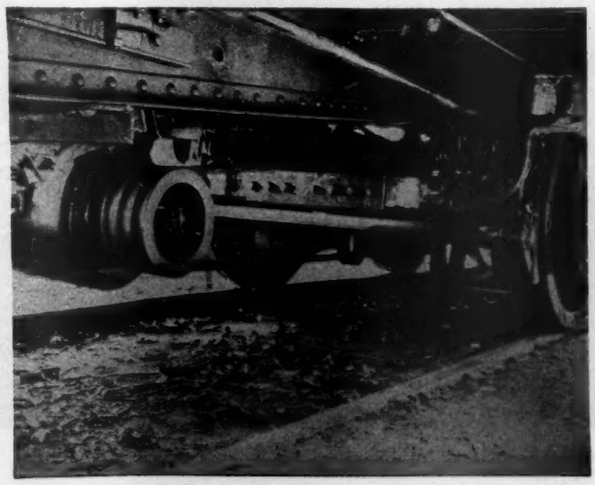
Texrope V-Belt Axle-Generator Drive

The Texrope V-belt drive, a product of the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has been adapted to driving axle generators on railroad passenger cars, some of which have traveled well over 125,000 miles to date with entirely satisfactory results and no appreciable signs of belt wear. The drive consists of three endless V-type belts, transmitting power from a special triple V-groove pulley on the car axle to a similar pulley of smaller diameter keyed to the generator shaft. The pulley grooves are so proportioned and designed as to provide a firm, slightly wedging contact with the belts and eliminating slipping. The depth of the grooves, in conjunction with the angle to which the sides are machined, is said to prevent any possibility of the V-belts running out of the grooves under ordinary curve conditions and resultant truck angularity.

The principal advantage claimed for the Texrope V-belt drive, as applied to car axle generators, is a high degree of reliability under all weather conditions. As stated, the belts are positively held in the correct running position. There are no joints to fail or give trouble. Each belt is designed more than strong enough to carry the whole load if anything should happen to the other two belts, thus providing an unusually large factor of safety. In freezing weather, the wedging action of the belts pulling into the grooves has a tendency to eliminate the collection of dirt and the formation of ice, thus preventing difficulty from these causes.

Another important advantage claimed for this type of axle-generator drive is high efficiency. Power is transmitted by the wedging action of the belts as they pull into the V-shaped grooves of the sheaves. This construction assures smooth and positive starting, the belts absorbing vibration and the drive being said to operate with an efficiency of 98.9 per cent. The absence of belt slip keeps the generator at charging speed all of the time the car is at this speed and thus assures dependable power for lights and battery charging. In those cases in which the drive has been used the car batteries have received enough charge on the road to make charging at terminals unnecessary. In freezing weather the Texropes were found to be entirely free from ice or frost.

A feature of the drive, which would at first seem a serious objection, is the fact that the belts are endless and that the inside pair of truck wheels must be dropped in order to install the endless belts around the axle. It is also necessary to cut a small piece out of the truck frame and install a spacer block and a channel iron as a bracing member. Experience indicates that this operation requires only a little time, however, and, in view of the high reliability and long service life anticipated with this type of



The Texrope triple V-belt drive as applied to a body-hung car-lighting generator

belt, the V-belts will not ordinarily have to be replaced except when the car is in the shop for other repairs.

This type of V-belt drive is widely used (over 100,000 installations) in general industry and, when used in paper mills and other plants where power drives are constantly subjected to excessive moisture, dust and dirt, has given excellent results. The absence of belt slip under these adverse conditions prevents "burning up" of the belts and promotes long and effective service life, characteristics which railroads would like to see incorporated to an increasing extent in their axle-generator driving equipment.

Protective Paint For Pipe Lines

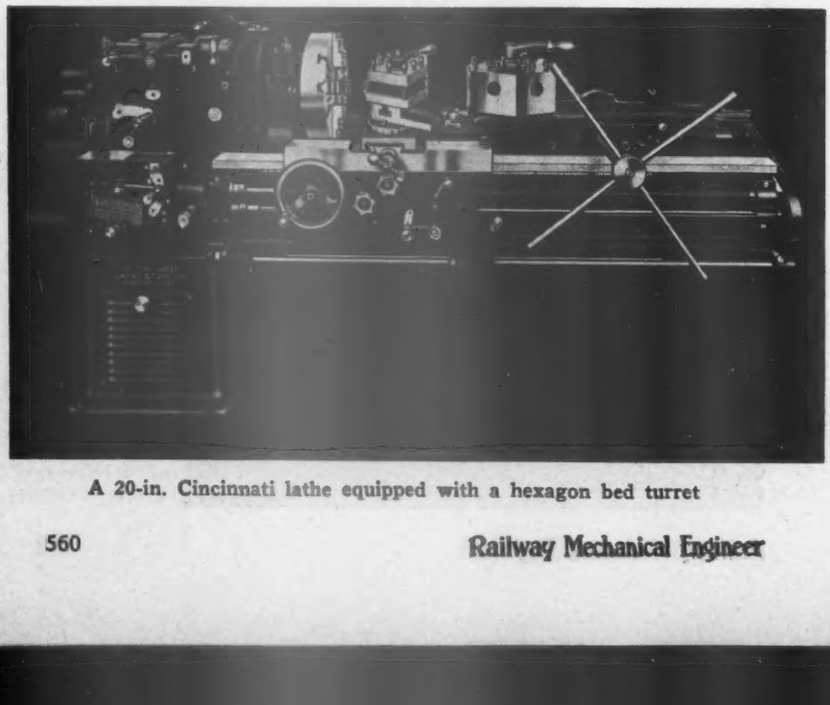
The American District Steam Company, North Tonawanda, N. Y., has developed a protective paint for use on steam and hot-water pipe lines. The product has been named Adsco Pipe-Kote 505. It is said to be impervious to any temperature generated by steam, to be practically immune to the action of moisture, dilute acids and alkalis, and that, while it produces an extremely hard, tenacious coating, it is sufficiently elastic to expand and contract with the pipe without cracking or peeling.

While Pipe-Kote is recommended for use on steam and hot-water lines, it works with equal effectiveness on gas and water mains, stacks, boiler fronts, bridges, and all other surfaces exposed to extreme or rapid changes of temperature and atmospheric conditions.

Turret Attachments For Cincinnati Lathes

The Cincinnati Lathe & Tool Company, Oakley, Cincinnati, Ohio, is now manufacturing hexagon bed turrets for the 16-in. to 32-in. lathes made by this company. The illustration shows one of the Cincinnati 20-in. by 10-ft lathes fitted with a hexagon bed turret, square tool block and four-jaw independent chuck. The hexagon bed turrets are automatically revolving and equipped with an automatic independent stop feed for each face of the turret.

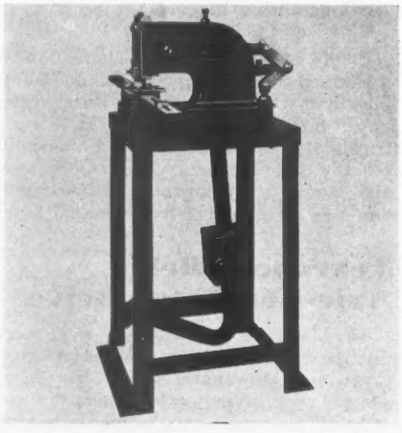
The feed may be either by hand or power. The power feed is actuated by a pulley drive from a rod at the back of the bed to the feed rod on the front of the machine. The power feed disengages automatically by a trip which stops within a reasonable degree of accuracy, but it is supplemented by a positive stop which enables the operator to finish lengths accurately to .001 in. A lever on the slide permits the indexing of the turret to any position without returning the slide to the extreme end of the stroke.



A 20-in. Cincinnati lathe equipped with a hexagon bed turret

Whitney Toggle-Lever Foot Press

The Whitney Metal Tool Company, Rockford, Ill., has recently placed on the market a type of toggle-lever foot press known as the No. 28 which has several new features of design. The capacity of this press is a 2-in. hole in a No. 16 gage sheet. The depth of the throat is 7 in., the height of throat, 4 in., and the stroke of the ram, one inch.

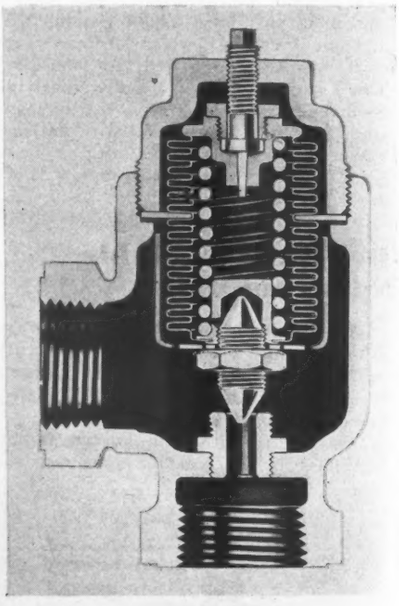


The Whitney press will punch 2-in. holes in No. 16 gage material

The machine has an adjustable regulation on the ram and positive-stop locking against the crank arm. The foot pedal is adjustable and there are six laminated hardened and ground tool-steel plates to take up the wear. The laminated discs can be arranged to adjust the stroke position of the ram one-half inch up or down. The machine is equipped with a bolster-plate die holder and the bolster plate is provided with a tee-slot. The speed of the machine is approximately 100 holes per minute.

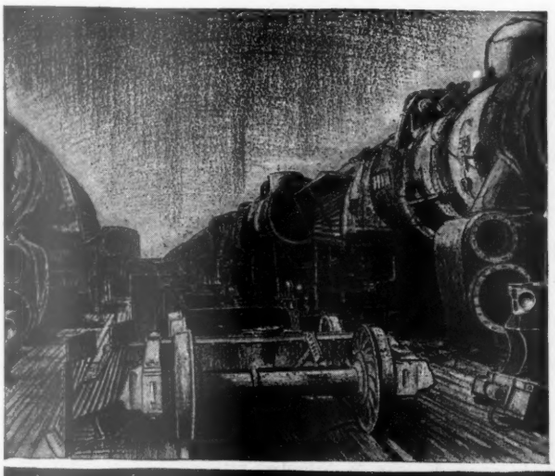
Steam Trap with Thermostatic Control

The C. J. Tagliabue Manufacturing Company, Brooklyn, N. Y., is now manufacturing a steam trap with a differential setting feature which makes it possible to discharge condensate at a temperature corresponding to a uniform differential pressure from 0 to 20 lb. below the operating steam pressure. If the trap is set to discharge condensate at a temperature corresponding to as much as 20 lb. less than the operating steam pressure, it will discharge the condensate at this differential regardless of whether the steam pressure is 50 lb. or 125 lb. The trap is controlled by a differential setting screw which applies compression to a spring. When the compression is applied a mechanical pressure is created on the inside of a bronze bellows which aids the vapor pressure developed in the bellows to close the valve. Thus the mechanical pressure exerted by the spring determines whether the trap will close at or below the operating temperature of the steam.



Sectional view of the Tag differential setting steam trap

Among the mechanical features of the trap are the reversible and renewable Monel metal seats and discs, a bronze body and bronze bellows. The trap is manufactured in only one size 1 in.—as it is claimed the full 5/16 in. opening of the valve assures ample capacity.



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An Epidemic of Parts Failures *Checked by the "Metal Doctor"*

SPRINGS on the new equipment were failing with appalling frequency. Designs were checked. Manufacture was looked to. And yet, the failures continued.

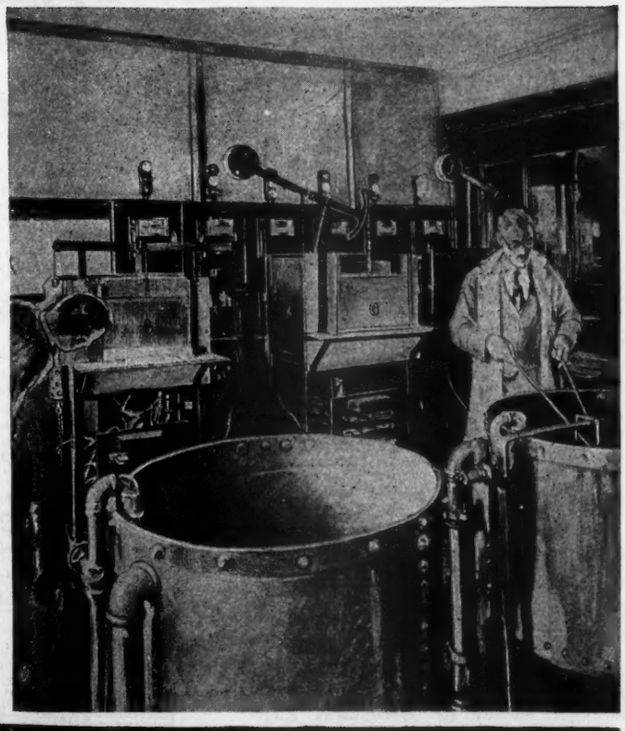
■ Republic metallurgists were appealed to. Conditions were analyzed; metallurgical examinations made, and a special alloy steel was chosen to remedy the trouble.

■ No longer is steel just steel. Alloys have given the metallurgist a multitude of steels with varying qualities with which to meet varying conditions of service.

■ For all these conditions, metallurgists of the Republic Steel Corporation have developed in the country's largest metallurgical research laboratories special alloy steels and irons.

■ These better materials are proving of the greatest assistance in controlling the rising tide of maintenance.

■ Where materials are a problem, consult the Republic Steel Corporation.



Central Alloy Division

REPUBLIC STEEL CORPORATION

Massillon, Ohio

Among the Clubs and Associations

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—W. M. Sheehan, manager eastern district sales of the General Steel Castings Corporation, will present a paper on Cast Steel Foundations for Railway Equipment at the meeting of the Southern & Southwestern Railway Club to be held at 10 a.m. on November 19 at the Ansley Hotel Roof Garden, Atlanta, Ga. Election of officers will also take place at this meeting.

NEW YORK RAILROAD CLUB.—The annual dinner of the New York Railroad Club is to be held this year on Thursday, December 17, at the Hotel Commodore, New York. Charles G. Melvin is general chairman of the dinner committee, and J. M. Davis, president of the Delaware, Lackawanna & Western, is chairman of the reception committee. H. H. Vreeland, chairman of the club's executive committee, will act as toastmaster at the dinner, while Dr. William Mather Lewis, president of Lafayette College, Easton, Pa., is to be the principal speaker.

INTERNATIONAL CONFERENCE ON BITUMINOUS COAL.—The Third International Conference on Bituminous Coal will be held under the auspices of the Carnegie Institute of Technology at Schenley Park, Pittsburgh, Pa., on November 16-21. The subject of railway fuel will be discussed Wednesday afternoon, November 18, the following papers having been arranged for this session:

Pulverized Fuel for Steam Locomotives, John C. Chapple, consulting engineer, St. Louis, Mo.
Trial and Road Results with Stug Pulverized Fuel Fired Locomotives, Richard O. Roosen, chief engineer, Henschel & Sohn, A. G. Kassel, Germany
Combustibility of Powdered Fuel in the Coal Dust Engine, T. Suwa, engineer, Imperial Japanese Fuel Research Institute, Tokyo
Railway Fuel, H. C. Woodbridge, manager, Rochester & Pittsburg Coal Company, Rochester, N. Y.
Associated with:
Malcolm Macfarlane, general fuel inspector, New York Central
C. P. Dampman, superintendent fuel conservation, Reading

D. F. Crawford, consulting engineer, Pittsburgh; F. M. Waring, engineer of tests, Pennsylvania, and P. A. Hollar, fuel agent, Pennsylvania, will discuss the papers.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—The annual meeting of the American Society of Mechanical Engineers will be held at the Engineering Societies building, New York, November 30 to December 4, inclusive. Honorary membership in the society will be conferred upon Dr. Palmer Chamberlain Ricketts on Tuesday evening, December 1, when Dr. Roy V. Wright, president, will also address the meeting. The Towne and Thurston Lectures will both be given at the meeting for the first time in several years. The Towne Lecture, which deals with the relationship between economics and engineering, will be delivered by Dean W. B. Donham of the Graduate School of Business Administration, Harvard University. The Thurston Lecture will be delivered by Dr. Edward L. Thorndike, professor of education at Teachers College, Columbia University, whose subject will be Psychology and Engineering. An interesting program resulting from the past year's study by the Committee on the Economic Status of the Engineer will be presented on Tuesday afternoon, December 1, and the series of talks on How To Talk with an Audience which was presented last year will be repeated at 8:50 a.m. on Tuesday, Wednesday and Thursday, December 1, 2 and 3, respectively, by Dr. S. Marion Tucker of the Polytechnic Institute of Brooklyn. The technical program in part is as follows:

MONDAY, NOVEMBER 30
Morning Session
Machine-Shop Practice and Applied Mechanics
Improved Device for Recording Instantaneous Tool Pressures in Machinability Studies, O. F. Gechter and H. R. Laird.
Photoelastic Developments.
a. Kinematography in Photoelasticity, Max M. Frocht.
b. Photoelastic Study of Shearing Stress in Keys and Keyways, A. G. Solakian and George B. Karelitz.
c. Celluloid as a Medium for Photoelastic Investigations, R. H. G. Edmonds and B. T. McMinn.

Afternoon Session
Metal Cutting
Elements of Milling, O. W. Boston and Charles E. Kraus.
Tungsten Carbide and Other Hard Cutting Materials, Progress Report No. 3 of Sub-Committee on Metal-Cutting Materials, Coleman Sellers, 3rd.
Motion Picture: Latest Development in German Machine Tools as Exhibited in Operation at Leipzig Trade Fair.

Evening
Exhibition of Art by Engineers.

TUESDAY, DECEMBER 1
Casting and Machine Design
Machine-Design Management, J. L. Alden.
Correlation of Design and Foundry, Alex Taub.
Progress Report of Machine-Shop Practice Division, C. deZafra.

Applied Mechanics and Railroads
Air Resistance of High-Speed Trains and Interurban Cars, O. G. Tietjens and K. C. Ripley.
Stresses in Railroad Track, S. Timoshenko and B. F. Langer.
Report of Railroad Division (by title).

Lubrication Research
Optimum Conditions in Journal Bearings, Albert Kingsbury.
Pressure Distribution in the Oil Films of Journal Bearings, S. A. and T. R. McKee.
Oil-Film Pressures in an End-Lubricated Sleeve Bearing, Louis J. Bradford.

Afternoon Session
General
Address by Francis Perkins on "State Labor Departments and Professional Engineers—Cooperation Essential to Progress in Accident Prevention."
Report of Committee on Economic Status of the Engineer.

WESTERN RAILWAY CLUB.—At the meeting of the Western Railway Club, scheduled to be held at the Hotel Sherman, Chicago, on November 16, the subject, "Patents and Railway Progress," will be presented by Charles L. Howard, assistant general counsel of the Western Railroad Association. Mr. Howard will describe the origin of patent laws and tell of early railway patents of unusual interest, devoting particular attention to such items as patentability, infringements, expired patents, the manufacture of repair parts for patented devices, patents granted to railway employees and the service afforded by the Western Railroad Association in connection with the railroads' use of patented articles.

Club Papers

Safety on the Railroads

Car Foremen's Association of Omaha.—Meeting held September 12 at Omaha, Neb. Subject, "Safety on the Railroads," presented by T. P. Schmidt, car foreman, Chicago, Milwaukee, St. Paul & Pacific, Council Bluffs, Iowa. ¶ After referring to the notable accomplishments of the railroads in accident prevention in all departments, including that devoted to the maintenance of car equipment, Mr. Schmidt called attention to a new type of potential hazard, aside from the loss of life or limbs, owing to the greatly increased amount of unauthorized riding on freight trains by hobos and other persons stealing rides in recent months. ¶ Regarding this subject, Mr. Schmidt said: "The railroad traveling public of the non-revenue type are good examples of the public's view of safety. For instance, I noted a train passing the other day which contained several tank cars loaded with gasoline and placarded all around for safety, with the running boards well occupied by passengers and a cloud of smoke emitting from pipes and cigarettes as if from a hot box. The weather was hot and the fumes of gasoline were in the air and, among the twelve or fifteen men aboard, no one gave a thought to the hazard involved. Railroad men are taught the dangers of such practices and shown their actual results, and we must guard our safety against non-observance by such people."

Air-Conditioned Passenger Cars

Western Railway Club. — Regular monthly meeting held at the Hotel Sherman, Chicago, Monday evening, October 19. Subject, "Steam Ejector System of Air Condition and Cooling Passenger Cars," presented by Richard Arf, mechanical engineer, Carrier Engineering Corporation, Newark, N. J. ¶ In the absence of President C. T. Ripley, chief mechani-

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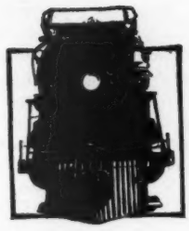

Do Not Put Obsolete Power Back Into Service

● *The best of the railroad's motive power is now being used to handle reduced traffic at reduced costs.*

Operation has been stepped up to the performance of this modern power.

To return stored locomotives to service as business resumes will mean the introduction of less efficient power and an unfavorable effect on operating costs. That is one reason why they are not now in use.

Prepare now to keep operations on the present efficient basis by having new Super-Power locomotives ready for the increased load as business improves.

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cal engineer, Atchison, Topeka & Santa Fe, the meeting was presided over by Vice-President O. E. Ward, superintendent of motive power, Chicago, Burlington & Quincy, and some introductory remarks were made by F. A. Isaacson, engineer of car construction, Santa Fe. Preceding the delivery of Mr. Arf's prepared address, which was illustrated by lantern slides, Fred Wendell, superintendent of dining-car service, Harvey System, Chicago, made the following general comments regarding air conditioning, with particular reference to the performance of the air-conditioned dining car now in service on the Santa Fe train, "The Chief": "The great majority of passengers entering the air-conditioned dining car comment that it is a travel comfort much needed on trains in the summer time, especially since the adoption of all-steel cars, which are a great deal warmer than the old-time wooden cars. But, some of them are somewhat skeptical as to its general effect on their health, caused by the difference of temperature of the other equipment on the train, which is not air cooled. ¶ Therefore, it is really necessary that other cars, especially observation, lounge and club cars, should also be cooled and air conditioned. Moreover, the traveling public is looking forward to the time when all cars are air conditioned, and the supervisors of dining cars operating on various railways will, no doubt, be pleased when this day comes. ¶ Since deck ventilators are not needed on air-conditioned cars, neither are window screens used. This eliminates dust, soot and cinders, which in itself makes for comfort and sanitation. To make a car comfortable in the summer time by the use of electric fans is not possible, as this only stirs up the hot air in the car. People all enjoy dining in comfort, but so far we have not noticed any great increase in the food consumption. While the guests consume more hot foods in the summer time in an air-cooled diner, they eat less of cold foods, especially cold meats, ice cream, cold melons and iced drinks. ¶ As to increased travel on account of air-conditioned cars, it is hard to determine at this time, although a good many people made their reservations on days of departure of the Chief which has one air-conditioned car. But, in general, it was not noticeable that this train carried more people than the other trains on this same run. There is no doubt in my mind that whenever the cars on all trains on this run are air-conditioned, it will draw considerable travel to it. The air-conditioning system will be a great success if simplified and modified. Temperatures should range from 70 to 80 deg., but never below 70 deg. The mechanical devices and compressors should be made as simple and fool-proof as possible and take up a minimum of space, thereby reducing the expense of maintenance and making the equipment easy to operate. The installation on this one car takes lots of attention by the dining-car steward and anything applied for air conditioning and cooling cars should be such that it will not be necessary for the dining-car steward to be a mechanic to handle it."

Directory

The following list gives names of secretaries, dates of next or regular meetings and places of meeting of mechanical associations and railroad clubs:

AIR-BRAKE ASSOCIATION.—T. L. Burton, Room 5605 Grand Central Terminal building, New York.

ALLIED RAILWAY SUPPLY ASSOCIATION.—F. W. Venton, Crane Company, Chicago.

AMERICAN RAILWAY ASSOCIATION.—DIVISION V.—MECHANICAL.—V. R. Hawthorne, 59 East Van Buren street, Chicago.
DIVISION V.—EQUIPMENT PAINTING SECTION.—V. R. Hawthorne, Chicago.
DIVISION VI.—PURCHASES AND STORES.—W. J. Farrell, 30 Vesey street, New York.
DIVISION I.—SAFETY SECTION.—J. C. Caviston, 30 Vesey street, New York.
DIVISION VIII.—CAR SERVICE DIVISION.—C. A. Buch, Seventeenth and H. streets, Washington, D. C.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, 11402 Calumet avenue, Chicago.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. Thirty-ninth street, New York.
RAILROAD DIVISION.—PAUL D. Mallay, chief engineer, transportation department, Johns-Manville Corporation, 292 Madison avenue, New York.
MACHINE SHOP PRACTICE DIVISION.—Carlos de Zafra, care of A. S. M. E., 29 West Thirty-ninth street, New York.
MATERIALS HANDLING DIVISION.—M. W. Potts, Alvey-Ferguson Company, 1440 Broadway, New York.
OIL AND GAS POWER DIVISION.—L. H. Morrison, associate editor, Power, 475 Tenth avenue, New York.
FUELS DIVISION.—A. D. Black, associate editor, Power, 475 Tenth avenue, New York.

AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eiseman, 7016 Euclid avenue, Cleveland, Ohio.

AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce street, Philadelphia, Pa.

AMERICAN WELDING SOCIETY.—Miss M. M. Kelly, 29 West Thirty-ninth street, New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Joseph A. Andrucetti, C. & N. W., Room 411, C. & N. W. Station, Chicago, Ill.

CANADIAN RAILWAY CLUB.—C. R. Crook, 2276 Wilson avenue, Montreal, Que. Regular meetings, second Monday of each month except in June, July and August, at Windsor Hotel, Montreal, Que.

CAR DEPARTMENT OFFICERS ASSOCIATION.—A. S. Sternberg, master car builder, Belt Railway of Chicago.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, 2514 West Fifty-Fifth street, Chicago. Regular meeting, second Monday in each month except June, July and August, Great Northern Hotel, Chicago, Ill.

CAR FOREMEN'S CLUB OF LOS ANGELES.—J. W. Krause, 608 South Main street, Los Angeles, Cal. Meetings second Monday of each month except July, August and September, in the Pacific Electric Club building, Los Angeles, Cal.

CAR FOREMEN'S ASSOCIATION OF OMAHA, Council Bluffs and South Omaha Interchange.—Geo. Kriegler, car foreman, Chicago, Burlington & Quincy, Sixteenth avenue and Sixth streets, Council Bluffs, Iowa. Regular meetings, second Thursday of each month at Council Bluffs.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS.—F. G. Weigman, 720 North Twenty-third street, East St. Louis, Ill. Regular meeting first Tuesday in each month, except July and August, at American Hotel Annex, St. Louis, Mo.

CENTRAL RAILWAY CLUB OF BUFFALO.—T. J. O'Donnell, executive secretary, Room 1817, Hotel Statler, Buffalo, N. Y. Regular meeting, second Thursday each month, except June, July and August, at Hotel Statler, Buffalo.

CINCINNATI RAILWAY CLUB.—D. R. Boyd, 453 East Sixth street, Cincinnati. Regular meeting second Tuesday, February, May, September and November.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Alder avenue, Cleveland, Ohio. Meeting second Monday each month, except June, July and August, at the Auditorium, Brotherhood of Railroad Trainmen's building, West Ninth and Superior avenue, Cleveland.

EASTERN CAR FOREMEN'S ASSOCIATION.—E. L. Brown, care of the Baltimore & Ohio, Staten Island, N. Y. Regular meetings fourth Friday of each month, except June, July, August and September.

INDIANAPOLIS CAR INSPECTION ASSOCIATION.—P. M. Pursian, 823 Big Four building, Indianapolis, Ind. Regular meetings first Monday of each month at Hotel Severin, Indianapolis, at 7 p.m. Noon-day luncheon 12:15 p.m. for Executive Committee and men interested in the car department.

INTERNATIONAL RAILROAD MASTER BLACKSMITH'S ASSOCIATION.—W. J. Mayer, Michigan Central, 2347 Clark avenue, Detroit, Mich.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. T. Winkless, Room 707, LaSalle Street Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—William Hall, 1061 W. Wabash street, Winona, Minn.

LOUISIANA CAR DEPARTMENT ASSOCIATION.—L. Brownlee, 3730 South Prieur street, New Orleans, La. Meetings third Thursday.

MASTER BOILERMAKERS' ASSOCIATION.—A. F. Stiglmeier, secretary, 29 Parkwood street, Albany, N. Y.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—See Car Department Officers Association.

NATIONAL SAFETY COUNCIL—STEAM RAILROAD SECTION.—W. A. Booth, Canadian National Montreal, Que. William Penn and Fort Pitt Hotels, Pittsburgh, Pa.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic avenue, Boston, Mass. Regular meeting, second Tuesday in each month, excepting June, July, August and September. Copley-Plaza Hotel, Boston.

NEW YORK RAILROAD CLUB.—Douglas I. McKay, executive secretary, 26 Cortlandt street, New York. Meetings third Friday in each month, except June, July and August, at 29 West Thirty-ninth street, New York.

PACIFIC RAILWAY CLUB.—W. S. Wollner, P. O. Box, 3275, San Francisco, Cal. Regular meetings, second Thursday of each month in San Francisco and Oakland, Cal., alternately.

PUEBLO CAR MEN'S ASSOCIATION.—I. F. Wharton, chief clerk, Interchange Bureau, Pueblo, Colo.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 1124 Woodward building, Washington, D. C.

RAILWAY CAR MEN'S CLUB OF PEORIA AND PEKIN.—C. L. Roberts, chief clerk, Peoria & Pekin Union Railway, 217 Lydia avenue, Peoria, Ill.

RAILWAY CLUB OF GREENVILLE.—Paul A. Minnis, Bessemer & Lake Erie, Greenville, Pa. Meetings third Tuesday of each month, except June, July and August.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 1841 Oliver building, Pittsburgh, Pa. Regular meeting fourth Thursday in month, except June, July and August, Ft. Pitt Hotel, Pittsburgh, Pa.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett. Baltimore & Ohio, Baltimore, Md.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver building, Pittsburgh, Pa. Meets with Mechanical Division and Purchases and Stores Division, American Railway Association.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, M. P. O. Drawer 24, St. Louis, Mo. Regular meetings, second Friday in each month, except June, July and August.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings third Thursday in January, March, May, July, September and November. Annual meeting third Thursday in November, Ansley Hotel, Atlanta, Ga.

SUPPLY MEN'S ASSOCIATION.—E. H. Hancock, treasurer, Louisville Varnish Company, Louisville, Ky. Meets with Equipment Painting Section, Mechanical Division American Railway Association.

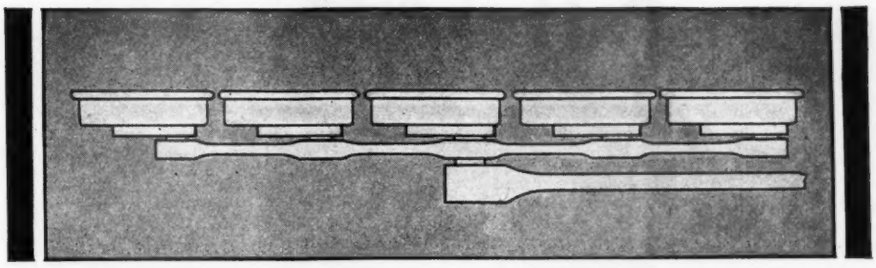
TORONTO RAILWAY CLUB.—J. A. Murphy, 1405 Canadian National Express building, Toronto 2, Ont. Meetings third Monday of each month, except June, July and August.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East Ninety-eight street, Cleveland, Ohio.

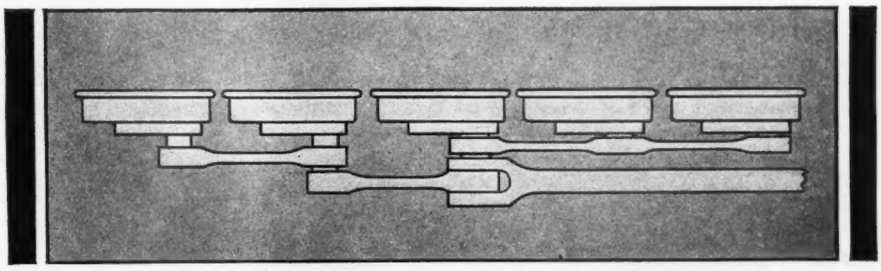
WESTERN RAILWAY CLUB.—J. H. Nash, 343 South Dearborn street, Chicago. Regular meetings, third Monday in each month.

(Turn to next left-hand page)

The expense incident to the operation of a locomotive with the old style design at right amounted to $0.012 per mile for material, $0.006 per mile for labor, or a total of $0.018 per mile for maintenance of rods and bushings. During the period of operation, the investment expense in the locomotive amounted to $0.238 per mile.



With Tandem Main Rod design, the expense incident to the operation amounted to $0.002 for material, $0.001 for labor, or a total of $0.003 per mile for maintenance of rods and bushings. During the period of operation, the investment expense in the locomotive amounted to $0.196 per mile.



TANDEM MAIN ROD DRIVE
Reduces Maintenance A Third

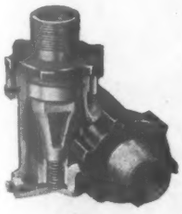
TO find out exactly what savings in maintenance expense Tandem Main Rod Drives could effect, a large eastern railroad ran a full year's test.

Two 2-10-2 locomotives of the same type, one with the old style main rod drive, the other equipped with Tandem Main Rod Drive made 30,300 and 36,800 miles respectively during the year. The railroad kept accurate records of both material and labor used for maintenance.

Tandem Main Rod Drive reduced the expense of maintaining rods and bushings from $0.018 per mile to $0.003, saving $0.015 per mile and reducing expense 83.3%.

Because the locomotive with Tandem Main Rod Drive required no rod maintenance, the investment expense was lowered from $0.238 to $0.196 per mile, saving $0.042 per mile, or a reduction of 17.7%.

Tandem Main Rod Drive distributes piston thrust through two axles and four outside main crank pins. It keeps the locomotive running for much longer periods without maintenance and pays for itself quickly.



THE FRANKLIN SLEEVE JOINT
Assures a full area opening and unrestricted passage for air, steam and oil.

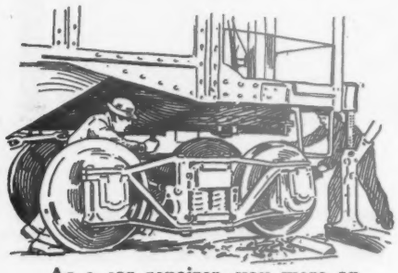
FRANKLIN RAILWAY SUPPLY CO., INC.
NEW YORK CHICAGO SAN FRANCISCO ST. LOUIS MONTREAL

NEWS

THE CHICAGO, BURLINGTON & QUINCY has awarded a contract to G. A. Johnson & Son, Chicago, for the construction of a new coach shop, 212 ft. by 311 ft., at Aurora, Ill., to replace the structure recently destroyed by fire. The new building will be of brick, concrete and steel construction.

Safety Section, A. R. A.

THE FREIGHT CONDUCTOR who gives to new brakemen the benefit of his long experience, embodying his good advice in



As a car repairer, you were an unsafe man

friendly talks, was the hero of the Safety Section circular for November.

The brakeman in the story has a ten-year-old son who aims to be "a railroader like Dad"; and with this as his text the conductor preaches a sermon on how to set a good example when thus looked up to. The sermon is reinforced with admonitions based on pictures like those shown herewith and others.

Multi-Class Travel Coming Says Ogden

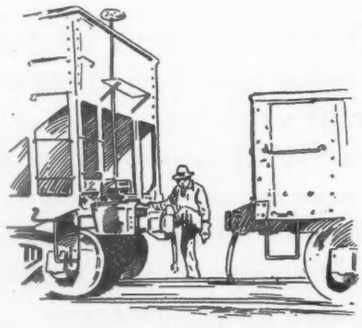
GEORGE D. OGDEN, New England vice-president of the Pennsylvania, addressing the Worcester (Mass.) Bond Club recently predicted that the railways would "ultimately realize that the European system of offering several distinct classes of passenger service has merits." This system, he said, "meets real needs, and is in no sense inconsistent with American institutions. We shall provide for the man who wishes to travel as cheaply as possible, and also for the one who can afford, and is willing to pay for, the super-luxuries.

"Store-door collection and delivery," he continued, "are destined to become universal. We, of the Pennsylvania, visualize the railways as the main arteries of travel and commerce, with their operations geared to heavy loads and high speeds, excelling in safety by a wide margin all other forms of transport, and serving directly only the large centers. Intermediate, local and feeder service, as well as short-distance service, is rapidly going to the highways.

"Electrification will be enormously extended, certainly to include all the densely populated areas, as well as service over heavy grades. The steam locomotive, however, is an extremely useful machine. Its complete disappearance, if that comes about at all, will be a matter of many years.

"The large railroad systems of the future will be completely integrated enterprises, serving the public by rail, highway, airway, waterway, lake and sea. Laws impeding them from so doing will be recognized as injurious, and repealed.

"Public opinion will undergo great changes with respect to the value of competition, particularly that which is artificially enforced by the so-called anti-trust laws. The rigors of the latter will surely yield to the march of progress—are visibly beginning to yield now. We shall have better, stronger and more useful railroads in the future than in the past, and the country's needs will give them more to do."

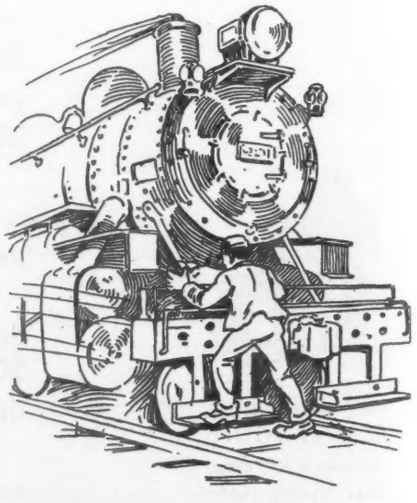


I saw you adjusting coupler with your foot as cars were coming together

Roads Should Be Allowed to Accumulate Reserves

THE RAILROADS could be made an agency to contribute very largely to a stabilization of industry in general if they were allowed to accumulate in times of prosperity reserves which could be used in times of depression for normal maintenance expenditures, Daniel Willard, president of the Baltimore & Ohio, testified before a sub-committee of the Senate committee on manufacturers which is holding hearings on proposals for a national economic council. Mr. Willard said that when business is good it would seem wise to let the railroads earn a larger return than the law contemplates so that it would not be necessary to make such drastic reductions in expenditures when business is bad in order to maintain financial integrity. He pointed out, however, that the recapture law proposes to take away from a railroad half of any excess over 6 per cent earned in good times although, as the law has been administered, the railroads as a whole have never been allowed the fair return contemplated by the law. He expressed doubts as to how much could be accomplished by such a national planning body as has been proposed by some witnesses before the committee.

D. B. Robertson, president of the Brotherhood of Locomotive Firemen and Enginemen and chairman of the Railway Labor Executives' Association, testifying before the committee on the following day, advocated the plan for a national economic council. He said that 500,000 railway employees had been thrown out of employment as the result of the depression and 250,000 more through technological developments in the industry and that the outlook is discouraging. He said that many men are now working only part time in order to spread employment and criticized the railway managements for failure to co-operate with the labor organizations on their plan for "stabilizing" employment.



Boarding a switch engine in this manner is dangerous

(Continued on second left-hand page)

Freight Car Orders Reported During October 1931

Name of Company	Number Ordered	Type	Builder
Continental Oil Company	30	Tank	Pressed Steel Car Co.
U. S. Navy Department	8	Flat	Magor Car Corp.
Chicago & Illinois Midland	500	Gondola	Pullman Car & Mfg. Co.
	250	Hopper	Pullman Car & Mfg. Co.
Aluminum Ore Company	10	Hopper	Canton Car Co.
Total for month	798		

No passenger car or locomotive orders reported during month of October, 1931

It Pays

STRICTLY Modern Locomotives, replacing those built before the establishment of present train schedules, create big additions to net operating income by lowering the cost per ton-mile of freight carried.

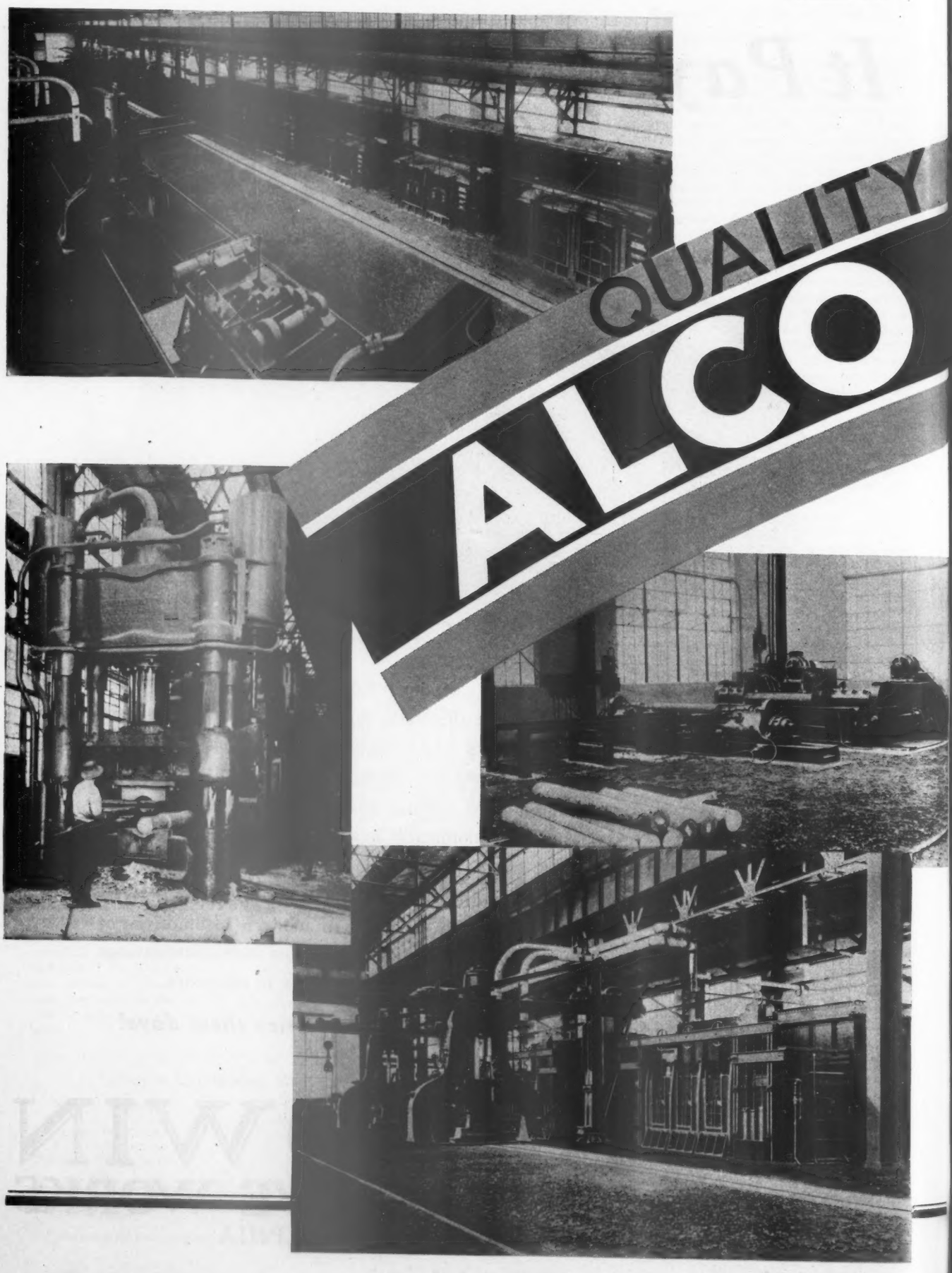
Thousands of locomotives now in use are no longer capable of economically handling the traffic assigned to them.

Careful studies of concrete situations show that replacement of such power with modern locomotives of adequate boiler horsepower will show immediate savings —paying for themselves in from six to ten years.

It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE
BALDWIN
LOCOMOTIVE WORKS
PHILADELPHIA


QUALITY
ALCO

ALL WAYS
FORGINGS
QUALITY ALWAYS

. . . . . The Service Rendered by ALCO Forgings Demonstrates the Value of ALCO'S Special Manufacturing Methods

PERFORMANCE is the yard stick of locomotive value. Maximum ton-miles for the fewest maintenance dollars is the objective. This can be realized only by quality forgings of extra structural stamina which insure long life and trouble-free performance in hard service. ALCO standards are high. Scientific methods backed by high grade raw materials and modern equipment safeguard the quality of ALCO Forgings.

Quality Raw Material

is the first essential requirement of quality forgings.

Rigid Inspections of Billets

Drillings are taken from all heats from at least six different billets representing different localities in the ingot. Complete chemical determinations are then made before the billets are approved.

All heats of high carbon steel are subjected to a tensile test for definite proof of physical soundness.

Alloy steels are subjected to full section macroscopic tests—a positive means of detecting thermal ruptures.

Proper Heating Before Forging

prevents damage to billets. Six regenerative furnaces equipped with indicating and recording pyrometers assure complete and scientific control of heating before withdrawal for forging.

Scientific Heat Treatment

is assured by a battery of eight oil-fired car bottom furnaces.

The forgings are so loaded to enable complete and uniform radiation and proper heat penetration. These furnaces also are equipped with indicating and recording pyrometers which write a continuous and complete history of the treatment.

All forgings, unless otherwise specified, are normalized and annealed to insure the best in grain refinement and the highest ductility with the desired tensile strength.

The economic worth of ALCO Forgings is proven in hard road service. For low cost dependable locomotive performance specify ALCO Forgings. You get quality all ways, always.

American Locomotive Company
30 Church Street New York N.Y.

Supply Trade Notes

A. A. PROBECK has been appointed sales manager of the Federal Machine & Welder Company, Warren, Ohio.

WILLIAM B. TURNER, division sales manager of the Truscon Steel Company at Youngstown, Ohio, has retired.

E. R. DOUGHERTY has been appointed representative of the American Manganese Steel Company, Chicago Heights, Ill., for the Chicago district.

THE SHEPARD NILES CRANE & HOIST CORPORATION, Montour Falls, N. Y., has moved its office from the People's Gas building to 564 West Monroe street.

THE BUCKEYE PORTABLE TOOL COMPANY, Dayton, Ohio, has moved its factory and offices from 135 Wayne avenue to larger quarters at 29 West Apple street, Dayton.

F. J. GRIFFITHS has joined the Timken organization at Canton, Ohio, and has been elected director and president of the Timken Steel & Tube Company. M. T. Lothrop, president of the Timken Roller Bearing Company, has been made chairman of the board of the Timken Steel & Tube Company. Mr. Griffiths has been identified with the steel industry for

F. J. Griffiths

30 years. Until recently he was associated with the Republic Steel Corporation as president of the Republic Research Corporation. Mr. Griffiths began his career in the steel industry with The United Steel Company at Canton, and later helped to organize The Central Steel Company, Massillon, Ohio, of which he was president and general manager. When these two companies were merged to form The Central Alloy Steel Company, he was chosen chairman of the board, which office he held until the Central Alloy was merged with the Republic Steel Corporation.

LEWIS E. PORTER, vice-president of S. F. Bowser & Co., Indianapolis, Ind., has been appointed vice-president and general manager of S. F. Bowser & Co., Ltd., Toronto, Ont. T. D. Kingsley, vice-president in charge of eastern sales, with headquarters at New York, has resigned.

H. W. DILLON has been appointed sales manager of the Gold Car Heating & Lighting Company, with headquarters at Brooklyn, N. Y.

THE VERONA TOOL WORKS, with main office at Pittsburgh, Pa., has changed its name to the Oakmont Forgings Company, after selling its physical assets to the Woodings-Verona Tool Works.

CHARLES O. GUERNSEY, who has been appointed chief engineer of The J. G. Brill Company, Philadelphia, Pa., and its subsidiary companies, is now in charge of all Brill engineering activities. Mr. Guernsey has been connected with the Brill organization since 1923. For 10 years previous he was affiliated with the Service Motor Truck Company, Wabash, Ind., as chief

Charles O. Guernsey

engineer and later as vice-president in charge of the company's railroad division, the activities of which were transferred to the Brill Company in 1923, when Mr. Guernsey was appointed chief engineer, automotive car division. Under his direction the line of Brill rail motor cars for steam railroads was developed, and he has been interested in the design of electric railway rolling stock and other types of urban and interurban transportation equipment and of the electric trolley bus. Mr. Guernsey was appointed chief automotive engineer on January 1 last, remaining in that position until the recent unification of all Brill engineering activities under Mr. Guernsey's direction. He will be located at the Philadelphia plant.

GEORGE E. TOTTEN, assistant manager of tin plate sales of the Jones & McLaughlin Steel Corporation, has resigned to become manager of sales of the tin plate division of the Republic Steel Corporation, Youngstown, Ohio.

FRANCIS D. WEST, manager of sales of the Paradon Company has returned to the service of the Permutit Company, New York, as district sales manager, with headquarters at 712 Brisbane building, Buffalo, N. Y. Mr. West was associated with the Permutit Company from 1918 until 1930.

CHARLES H. GAYETTY, who has been appointed manager of railroad sales of the Keasbey & Mattison Company, Ambler, Pa., was born at Oil City, Pa. He was educated in the high schools of his native city and also attended Temple University, Philadelphia, Pa. He began railway work in the operating department of the Pennsylvania at Oil City, and subse-

Charles H. Gayetty

quently served in the general freight department of the same road at its Broad Street Station, Philadelphia, remaining with the Pennsylvania for a total period of 11 years. Mr. Gayetty subsequently was in charge of sales of the railroad department of the Quaker City Rubber Company, Philadelphia. For the past five years he has been with the railroad department of the Boston Woven Hose & Rubber Company, Boston, Mass., and now becomes manager of railroad sales for the Keasbey & Mattison Company. Mr. Gayetty has been active at the conventions of the American Railway Association, held at Atlantic City, N. J., having served as chairman of the enrollment committee; and also, at a number of the conventions, as a member of the executive committee of the Railway Supply Manufacturers' Association.

THE PENNSYLVANIA PUMP & COMPRESSOR COMPANY, Easton, Pa., has formed a connection with Byer Engineering Associates, of the same city, with branch offices at 136 Liberty street, New York, and 1328 Chestnut street, Philadelphia, Pa.

THE LUDLOW VALVE MANUFACTURING COMPANY, Troy, N. Y., will manufacture its products for Canadian distribution under the name of The Canadian Ludlow Valve Manufacturing Company, Limited, 930 Wellington street, Montreal, Que., with factories at Three Rivers, Que., St. Thomas, Ont., and Fort William, Ont.

WILLIAM T. BENTZ has been appointed manager of sales of rail steel products, of the Republic Steel Corporation, Youngstown, Ohio. Mr. Bentz was formerly sales head of Steel & Tubes, Inc., a subsidiary of the Republic Steel Corporation. He will continue for the present to have his headquarters at Cleveland, Ohio.

(Continued on next left-hand page)

OLD Angle Cocks may now have this SECURE FASTENING

OUR improved angle cock having U bolt extension—now supplied with all new complete air brake equipments—permits such secure fastening as to prevent the cock turning or shifting its position, and support the pipe firmly back of the threaded joint.

Old angle cocks may have this feature added to them by inserting the bushing shown in the illustration . . . We suggest that all old standard angle cocks be converted by adding the bushing so as to obtain the recognized advantages of secure fastening—Complete information may be obtained by writing our nearest district office.

WESTINGHOUSE AIR BRAKE COMPANY

General Office and Works » » » WILMERDING, PA.

(1219)

EDWARD S. SULLIVAN, assistant coast agent of the St. Louis Car Company, has been promoted to coast agent, with headquarters at San Francisco, Cal., to succeed Gus Koch, deceased.

ROBERT S. BINKERD, formerly vice-chairman of the Eastern Railroads' Committee on Public Relations and latterly active in financial circles in New York, has been appointed director of sales of the Baldwin Locomotive Works.

HARRY S. SLEICHER, formerly vice-president of the North American Refractories Company, has severed his connection with that company and is now associated with the General Refractories Company in a sales capacity, with headquarters at New York.

CHANGES IN the sales organization and additions to the staff of the Worthington Pump & Machinery Corporation, Harrison, N. J., as made effective recently, include the appointments of Otto Nonnenbruch, for the past four years chief engineer of the Diesel department of I. P. Morris and De La Vergne, Inc., Philadelphia, Pa.; as special sales representative with headquarters at Buffalo, N. Y.; of J. B. Allen, formerly president of the Allen Engineering Company, Bridgeport, Conn., and prior to that time with the Sperry Gyroscope Company, Brooklyn, N. Y., as special marine representative for Worthington, with headquarters at Harrison, and of H. G. Wood, formerly assistant manager of the New England division of the Westinghouse Electric & Manufacturing Company, as electrical sales engineer. E. M. Paullin, Jr., previously associated with the New York office of the General Electric Company as synchronous motor specialist, has been appointed electrical sales engineer at the Cincinnati, Ohio, works of the Worthington Corporation. John T. Clancy, assistant manager, Buffalo works sales division, has been transferred to Harrison, N. J.; E. W. Hammond has been transferred from Buffalo to Los Angeles, Cal., as special representative of Diesel and gas engine sales on the Pacific Coast, and A. M. Boehm has been appointed to a similar position at Kansas City, Mo., from the sales department of the Buffalo works. Joseph F. Hecking, formerly with the Diesel engine sales division in New York, has been assigned to the Diesel and gas engine sales division at Buffalo, and William J. Daly, assistant manager, Cincinnati works sales division, has been transferred to Pittsburgh, Pa., on special sales work. G. A. Herrmann and W. R. Kennedy, formerly sales engineers at Chicago and Pittsburgh, have been appointed acting district managers at St. Paul, Minn., and Kansas City, respectively.

FRANK J. BAUMIS, formerly vice-president of Manning, Maxwell & Moore, Inc., and more recently with the Ingersoll-Rand Company, has organized the F. J. Baumis Company, with offices in New York and Boston, Mass. The new company will specialize in highway equipment for railroads and their affiliates, representing Warford Highway Transportation, manufacturers of motor truck chassis, and allied lines.

Gaylord Elected President of Machine Tool Builders

ROBERT M. GAYLORD, president of the Ingersoll Milling Machine Company, has been elected president of the National Machine Tool Builders' Association. Clayton R. Burt, president and general manager of the Pratt & Whitney Company, has been elected first vice-president; Henry S. Beal, assistant general manager of the Jones & Lamson Machine Company, second vice-president, and G. E. Randles, president of the Foote-Burt Company, treasurer. S. Owen Livingston, first vice-president of the Gallmeyer & Livingston Company; E. A. Muller, president and treasurer of the King Machine Tool Company, and H. S. Robinson, secretary and sales manager of the Cincinnati Shaper Company, have been elected directors.

New Simmons-Boardman Officers

AS A SEQUEL to the election of Samuel O. Dunn and Henry Lee, formerly vice-presidents, to the chairmanship and presidency, respectively, of the Simmons-Boardman Publishing Company, publishers of *Railway Mechanical Engineer* and other railway and marine periodicals, other elections and appointments have been made as follows: Roy V. Wright, secretary of the company, has been elected vice-president and secretary; George Slate, business manager of Marine Engineering and the Boiler Maker and a director of the company, has been elected also vice-president; Elmer T. Howson, western editor of Railway Age and editor of Railway Engineering and Maintenance, has been elected vice-president and a director; Frederick H. Thompson, vice-president in charge of the Cleveland office has been named to the directorate; and Frederick C. Koch, manager of advertising sales of the railway publications division of the company, has been elected vice-president. The headquarters of each will continue at heretofore; i.e., Messrs. Wright, Slate and Koch at New York, Mr. Thompson at Cleveland and Mr. Howson at Chicago.

Roy V. Wright was born at Red Wing, Minn., on October 8, 1876, and was educated at the University of Minnesota, from which he was graduated in 1898 with the degree of M.E. He entered railway service in the same year as a machinist apprentice on the Chicago, Milwaukee & St. Paul at South Minneapolis, Minn. Two years later he joined the staff of the Chicago Great Western as a draftsman and later became chief draftsman. In 1901 he was appointed mechanical engineer of the Pittsburgh & Lake Erie, which office he resigned in 1904 to become associate editor of the American Engineer and Railroad Journal (now the *Railway Mechanical Engineer*) In the following year he became editor of that publication and continued as such until 1910, when he became mechanical department editor of the Railway Age-Gazette (now Railway Age). In the following year he was appointed managing editor and has since continued in

Roy V. Wright

that capacity. Since 1912 he has also been editor of the *Railway Mechanical Engineer* and of the Car Builders Cyclopedia and the Locomotive Cyclopedia. He was elected a director of the Simmons-Boardman Publishing Company in 1915 and secretary in 1919. He is a member of the Transportation Committee and the Industrial Committee and chairman of the Board of Publications of the National Council of the Y. M. C. A. He served two terms as president of the United Engineering Society, New York, and is at the present time president of the American Society of Mechanical Engineers, in the work of which association he has long taken a prominent part. He is a member of the executive committee of the New York Railroad Club and of the advisory board of the department of smoke regulation of Hudson County (N. J.). Last June the degree of Doctor of Engineering, *honoris causa*, was bestowed upon him by Stevens Institute of Technology.

George Slate was born on September 27, 1874, at Oxford, Mich. He was edu-

George Slate

cated in the public schools of Alma and Grand Rapids, Mich., and started his business career in the classified advertising department of the Philadelphia Press,

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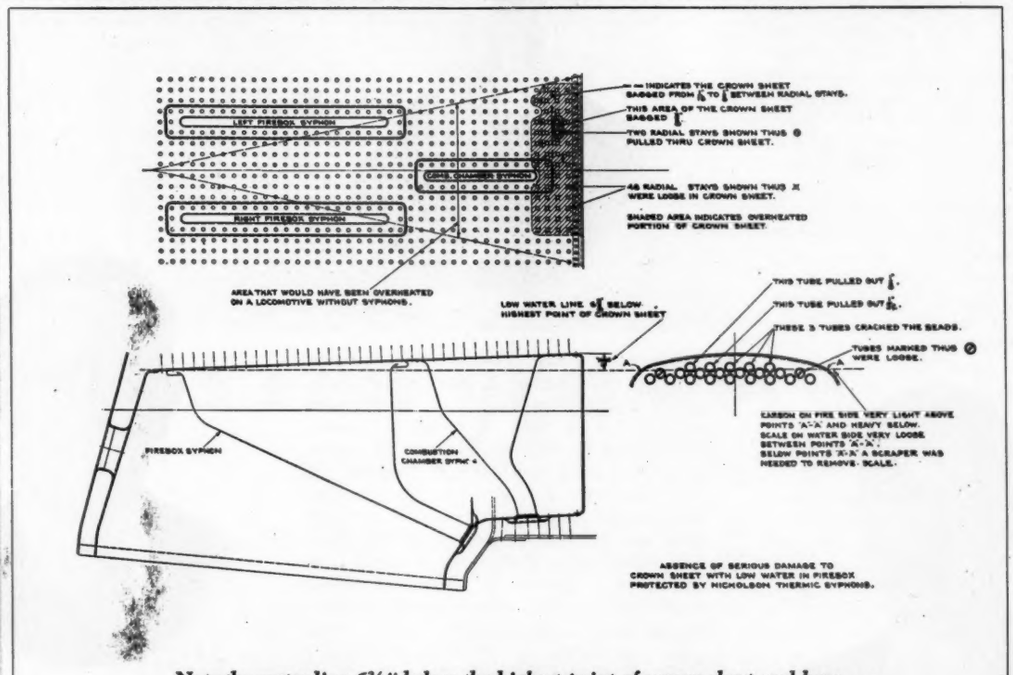
For the Third Time—
The Combustion Chamber
SYPHON
Has Proven Its Value as a
SAFETY DEVICE


LEFT FIREBOX SYPHON
COMB. CHAMBER SYPHON
RIGHT FIREBOX SYPHON
— — INDICATES THE CROWN SHEET BAGGED FROM 1/4 TO 1/2 BETWEEN RADIAL STAYS.
THIS AREA OF THE CROWN SHEET BAGGED 1/2
TWO RADIAL STAYS SHOWN THUS ⊗ PULLED THRU CROWN SHEET.
48 RADIAL STAYS SHOWN THUS ✕ WERE LOOSE IN CROWN SHEET.
SHADED AREA INDICATES OVERHEATED PORTION OF CROWN SHEET.
AREA THAT WOULD HAVE BEEN OVERHEATED ON A LOCOMOTIVE WITHOUT SYPHONS.
LOW WATER LINE 6 3/8 BELOW HIGHEST POINT OF CROWN SHEET
THIS TUBE PULLED OUT 1/2.
THIS TUBE PULLED OUT 1/4.
THESE 3 TUBES CRACKED THE BEADS.
TUBES MARKED THUS ⊘ WERE LOOSE.
FIREBOX SYPHON
COMBUSTION CHAMBER SYPHON
CARBON ON FIRE SIDE VERY LIGHT ABOVE POINTS 'A'-'A' AND HEAVY BELOW. SCALE ON WATER SIDE VERY LOOSE BETWEEN POINTS 'A'-'A'. BELOW POINTS 'A'-'A' A SCRAPER WAS NEEDED TO REMOVE SCALE.
ABSENCE OF SERIOUS DAMAGE TO CROWN SHEET WITH LOW WATER IN FIREBOX PROTECTED BY NICHOLSON THERMIC SYPHONS.

Note the water line 6⅜" below the highest point of crown sheet and how the water flowing from the Syphons prevented excessive over-heating. The cost of repairs will approximate $200.00.

The crown sheet of a Syphon-equipped locomotive carrying 240 pounds steam pressure after recently passing a severe low water test.

This is the twenty-fifth case of low water on locomotives equipped with Syphons of which we have been advised. Water levels have been as low as 16" below the tops of the crown sheets. Syphons ALWAYS prevent serious damage.

LOCOMOTIVE FIREBOX COMPANY

NEW YORK CHICAGO MONTREAL

later moving to New York where he served the New York Journal in a similar capacity. His association with Marine Engineering dates back over 30 years, he having joined the staff of that publication as an advertising salesman on October 14, 1901. He was later elected a vice-president of the Aldrich Publishing Company, which at that time published that periodical. The company in 1905 acquired The Boiler Maker and Mr. Slate's jurisdiction was extended to include that journal as well as Marine Engineering. In 1920 the Aldrich Publishing Company with its two publications was acquired by the Simmons-Boardman Publishing Company and shortly thereafter Mr. Slate was elected a director of the latter company, on which board he has since served continuously. He is an associate member of the Society of Naval Architects and Marine Engineers. He was for 15 years secretary and treasurer of the Boiler Maker Supply Men's Association and has long interested himself in the affairs of that organization and the Master Boiler Makers Association. He has also been active in the work of the Associated Business Papers, Inc., and in the business paper division of the Audit Bureau of Circulations.

Elmer T. Howson was born at Folletts, Iowa, on May 23, 1884, and was educated at the University of Wisconsin, from which he received his B.S. degree in 1906 and his C.E. degree in 1914. He entered railway service in 1903 as field draftsman for the Iowa & Illinois Railway (now the

Elmer T. Howson

Clinton, Davenport & Muscatine). He later became an instrumentman for the same road and in 1905 went with the Chicago, Burlington & Quincy in the same capacity. From 1906 to 1909 he was a resident engineer and assistant engineer on heavy construction of the same road and from 1909 to 1911 was division engineer. In the latter year he entered the service of the Railway Age-Gazette as engineering editor and in 1919 was appointed Western editor of the Railway Age, in which capacity he has since served continuously. Since 1916 he has also been editor of Railway Engineering and Maintenance and of the Railway Engineering and Maintenance Cyclopedia. He is a past president of the American Railway Bridge and Building Association, the Western Society of Engineers, the Track Supply Association and the National Conference of Business Paper Editors. At the present time he is president of the Roadmasters' and Maintenance of Way Association, first vice-president of the American Wood-Preservers' Association, a member of the executive council of the American Association of Railroad Superintendents, and a member of the executive committee of Associated Business, Papers, Inc. He is a member of the Society of Civil Engineers, which he has served as chairman of its Illinois section.

Frederick H. Thompson was born in Cleveland, Ohio, on August 1, 1885. He attended the Brooks School at Cleveland and the University School and Military

Frederick Hurd Thompson

Institute at East Orange, N. J. He started his business career as a newspaper reporter in New York in 1902 and served for a time as dramatic critic. From 1904 to 1907 he was eastern representative of the Music Trade Review. He was business manager of the *Railway Mechanical Engineer* from 1912 to 1920 and was general manager for the Simmons-Boardman Publishing Company in the Central district at Cleveland, Ohio, from 1920 to 1924. Since the latter date he has been a vice-president of the company in charge of the Central district, with offices at Cleveland.

Frederick C. Koch was born in Jersey City, N. J., on June 9, 1893, and was

Frederick C. Koch

educated in the public schools of New York. He entered the employ of the Railway Age-Gazette in 1909 in a minor capacity and rose through various clerical positions to the managership of the advertising make-up department. In 1917 he became advertising sales representative for all Simmons-Boardman transportation publications with the title of assistant to vice-president. In 1925 he was appointed business manager of Railway Engineering and Maintenance and continued in that capacity until a few months ago when he was appointed manager of advertising sales of the railway publication division of the Simmons-Boardman Publishing Company.

Obituary

WILLIAM K. BIXBY, who retired as president of the American Car & Foundry Company in 1905, died in St. Louis, Mo., on October 29, from myocarditis.

ROBERT H. RIPLEY, senior vice-president of the American Steel Foundries and chairman of the board of the General Steel Castings Corporation, died in Chicago on November 4. Mr. Ripley had been identified with the steel castings and steel railway equipment industries during his entire business career of more than thirty years, with the exception of about

R. H. Ripley

one year when he practiced law in Chicago following his graduation from Cornell University in 1899 with an L.L.B. degree. He was a son of Edward P. Ripley, former president of the Atchison, Topeka & Santa Fe, and was born at Boston, Mass., on June 6, 1876. Prior to entering Cornell he attended Shattuck Scientific School at Fairibault, Minn. During 1901 and 1902 he served as a salesman for the Railway Steel Spring Company, being later connected with the Simplex Railway Appliance Company until 1905 when that company became a part of the American Steel Foundries. He was appointed a vice-president of the American Steel Foundries in 1905 and for the past two years had been senior vice-president. Early in 1929 he was elected also president of the General Steel Castings Corporation, which position he held until June 6, 1931, when he became chairman of the board.

A FEW QUICK STROKES--
and the Job is **DONE!**

LESS THAN 30 SECONDS FROM START TO FINISH AFFORDS THOROUGH LUBRICATION—

Whether a locomotive comes to a stop in terminal, at station or on line of road, lubrication of its connecting rod bearings is a quick, easy job with "Spee-D" equipment. Every bearing is readily accessible—no moving of the locomotive is necessary. Gun is attached, bearing lubricated and gun detached in less than thirty seconds by actual timing. And the job is done thoroughly. For "Spee-D" High Pressure Grease Guns give a pressure up to 7,000 lbs. per square inch. This pressure raises the rod and places a film of grease over the pin. The locomotive is ready to roll again in far less time than required under the old screw-down method.

REDUCES MAINTENANCE COSTS

The speed of application makes possible attention to rod lubrication at short station stops, without delaying fast trains, while the efficiency of lubrication adds to the service-life of bearings and insures longer runs than is possible under the old method. Train service is faster and intervals between shopping are longer. Time, labor, and grease are saved, and renewal of plugs and bushings is eliminated. So much so that those railroads using "Spee-D" equipment estimate that their equipment has more than paid for itself within the first year of service!

Agents and Representatives

H. C. Manchester, 3712 Grand Central Terminal, New York City

A. L. Dixon, 325 W. Ohio St., Chicago, Illinois

Consolidated Equipment Company, Montreal

Mumford Medland, Ltd., Winnipeg

International Railway Supply Company, 30 Church St., New York City

May we send you further details?

RELIANCE MACHINE & STAMPING WORKS, Inc.

New Orleans, La.

C. B. WOODWORTH, manager of the railroad division of the Vanadium Corporation of America, with headquarters at Chicago, died at his home on October 24. Mr. Woodworth was graduated in mechanical engineering from Purdue University in 1907 and from then until 1916 he served with the mechanical departments of the Wabash and the Baltimore & Ohio

C. B. Woodworth

in various capacities from machinist to general foreman of the Mt. Clare shops of the B. & O. He then entered the employ of the American Arch Company, serving until 1918, when he received a commission as captain of engineers in the United States Army. After a service of 15 months with the A. E. F. on railroad work in France, he returned to this country and joined the foreign sales department of the American Locomotive Company, spending six years in the Argentine and in Brazil engaged in sales and service work. In 1926 he went with the Premier Staybolt Company as special technical representative; in May of the following year he left that service to become manager of the western division of the Vanadium Corporation of America, at Chicago, and in August, 1930, was appointed manager of the railroad division.

NATHANIEL CURRY, chairman of the board of the Canadian Car & Foundry Company, and a member of the Canadian Senate, died at his summer home at Tidnish, N. S., on October 23. Mr. Curry was born on March 26, 1851, in Kings county, Nova Scotia. In association with Nathaniel Rhodes, he founded Rhodes-Curry, Ltd., and was instrumental in consolidating that company with several other Canadian plants to form the Canadian Car & Foundry Company. He first served as president of the latter company, but several years ago retired from that office to become chairman of the board. Mr. Curry had spent some years in the United States in connection with railway and mining companies; he had been at various times connected with a number of industrial concerns as president or director, and had served as a member of the Canadian Senate since 1912.

GEORGE WAGSTAFF, formerly traveling engineer of the American Arch Company New York, who retired from active service about three years ago, died on October 11 at his home in West New York, N. J. He was born on March 29, 1858, at Shropshire, England. Mr. Wagstaff, who joined the American Arch Company in 1910, was well known in the railway field having previously served since 1879 in various positions in the United States with the Lehigh Valley, the Rome Locomotive Works, the Delaware, Lackawanna & Western, the Grant Locomotive Works the Chicago & North Western, and the New York Central, until 1903, when he was appointed assistant master mechanic

George Wagstaff

of the Collinwood shops of the Lake Shore & Michigan Southern. He subsequently served as supervisor of boilers on the New York Central Lines from 1905 to 1908, and then with the American Locomotive Equipment Company until 1910, when he entered the service of the American Arch Company. Mr. Wagstaff was the first president of the Master Boilermakers' Association, and had served as chairman of its executive committee.

LEE W. BARBER, president of the Standard Car Truck Company, Chicago, died at Monrovia, Cal., on October 19. He was born on June 12, 1874, at Sedalia, Mo., and took up the study of medicine at the

Lee W. Barber

University of Minnesota. After being forced to relinquish his studies because of ill health, Mr. Barber entered the service of the Standard Car Truck Company as an inspector of equipment. He was promoted successively through various positions including that of secretary and assistant treasurer, being elected president in 1920.

Personal Mention

General

J. P. CHADWICK, mechanical engineer of the Southern, at Washington, D. C., has been appointed to assistant to vice-president, mechanical, succeeding R. L. Ettenger, transferred at his own request, to the position of mechanical engineer.

W. R. LYE, district superintendent of motive power on the New York Central, with headquarters at Collinwood, Ohio, has assumed also the duties of the superintendent of shops at the same point, succeeding W. J. Shasberger. The position of superintendent of shops has been abolished.

J. A. SHEEDY, superintendent of motive power of the Northwestern division of the Pennsylvania at Chicago, has been transferred to the Southwestern division, with headquarters at Indianapolis, Ind., succeeding G. W. West, acting superintendent of motive power, who has been appointed superintendent of the Monongahela division.

MARTIN F. BROWN, general fuel supervisor of the Northern Pacific, with headquarters at St. Paul, Minn., has been granted an indefinite leave of absence on account of ill health. The duties of general fuel supervisor have been assumed by Clarence E. Allen, assistant to mechanical superintendent, at St. Paul.

Master Mechanics and Road Foremen

OTTO J. PROTZ has been appointed assistant master mechanic of the Iowa, Northern Iowa and Sioux City divisions of the Chicago & North Western, with headquarters at Clinton, Iowa.

W. S. WHITFORD, master mechanic of the Iowa division of the Chicago & North Western at Clinton, Iowa, has been appointed master mechanic of the Iowa, Northern Iowa and Sioux City divisions, with headquarters at Boone, Iowa.

J. B. MOORE, master mechanic of the Northern Iowa division of the Chicago & North Western at Belle Plaine, Iowa, has been transferred to the Peninsula division, with headquarters at Escanaba, Mich., to succeed O. J. Protz.

M. J. HAYES, general foreman, locomotive department, of the Toronto, Hamilton & Buffalo, has been appointed master mechanic. The position of superintendent motive power rendered vacant by the death of W. T. Kuhn has been abolished.

Car Department

E. F. PALMER, general car foreman of the Chicago, Milwaukee, St. Paul & Pacific at Sioux City, Iowa, has been transferred to the position of general car foreman at Green Bay, Wis.

(Continued on next left-hand page)

. . . consider this point

British Representative: RICHARD LLOYD & CO., LTD.

—there is more in a tool than STEEL!

There are dozens of different makes of metal cutting tools used in the railroad industry. How effectively they perform depends on fundamental design, soundness of fabrication and suitability to conditions . . . INTANGIBLES!

Therefore, you can't buy inserted blade tools by weight. You must buy service as well as steel. And service to us means also selling service — all our men are qualified to act as technical advisers . . . and back in Shelton, ready to start for your shop, are engineers who have pioneered in this business . . . they *know*. It is their duty to help our customers lick tough problems . . . and to get the best possible service out of metal cutting tools. We would be glad to hear from those with real problems.

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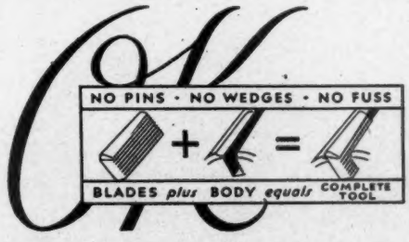

THE O. K. TOOL COMPANY, INC.
SHELTON . . . . . CONN.

ORIGINAL RESEARCH · SKILLED ENGINEERING · COMPLETE FACILITIES · FIELD INSPECTION

F. A. SHOULTY has been appointed general car foreman of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Sioux City.

M. L. HYNES, general car foreman of the Chicago, Milwaukee, St. Paul & Pacific, at Green Bay, Wis., has been transferred to the position of general car foreman at Milwaukee, Wis.

W. E. CAMPBELL, general car foreman of the Chicago, Milwaukee, St. Paul & Pacific, at Milwaukee, Wis., has been promoted to the newly-created position of district master car builder on the Western Lines, with headquarters at Tacoma, Wash.

Shop and Enginehouse

J. S. FLOW, general foreman of the Southern at Selma, N. C. ,has been transferred to the position of general foreman at Greensboro, N. C.

D. A. MARCHE, assistant night engine house foreman of the Southern at Spencer, N. C., has been appointed assistant day enginehouse foreman.

D. M. KEEVER, assistant day enginehouse foreman of the Southern at Greensboro, N. C., has been promoted to the position of general foreman, with headquarters at Selma, N. C.

O. R. DIAMOND, foreman, locomotive department, of the Kansas City Southern at Shreveport, La., has been transferred to the position of general foreman at Kansas City, Mo.

THE POSITION of assistant shop superintendent of the Atchison, Topeka & Santa Fe at Topeka, Kan., which was occupied by W. L. Jury, has been abolished, and the duties of this office have been assigned to J. H. Armstrong, general foreman locomotive shops.

G. B. HART, assistant to the general superintendent of motive power of the Southern Pacific, Pacific lines, with headquarters at San Francisco, Cal., has been appointed superintendent of the Los Angeles (Cal.) general shops, succeeding H. H. Carrick, who has retired. The position of assistant to the general superintendent of motive power has been discontinued.

Purchasing and Stores

JOHN OTTO has been appointed general storekeeper of the Elgin, Joliet & Eastern, with headquarters at Joliet, Ill.

W. R. CULVER has been appointed general storekeeper of the Chesapeake & Ohio, with headquarters at Huntington, W. Va. The position of general supervisor of stores has been abolished.

E. A. CARLSON has been appointed general storekeeper of the Pere Marquette, with headquarters at Grand Rapids, Mich. The positions of general supervisor of stores and of assistant general storekeeper have been abolished.

W. G. BLACK has been appointed assistant vice-president of the Chesapeake & Ohio and the Pere Marquette, with headquarters at Cleveland, Ohio. Mr. Black will have charge of purchases and stores, in addition to the duties he has heretofore performed.

THE JURISDICTION of G. D. Tombs, division storekeeper on the Illinois Central, with headquarters at Memphis, Tenn., has been extended to include the Vicksburg Route and New Orleans divisions. The position of division storekeeper of the latter divisions which has been held by C. S. Roberts, with headquarters at Vicksburg, Miss., has been abolished and Mr. Roberts has been assigned to other duties. The jurisdiction of the Burncide general store, Chicago, has been extended to include the Illinois and Springfield divisions; the position of division storekeeper of these divisions, which has been held by R. J. Gable, with headquarters at Clinton, Ill., has been abolished, and Mr. Gable has also been assigned to other duties.

Obituary

GEORGE H. LANGTON, general master mechanic of the Chesapeake & Ohio, eastern general division, with headquarters at Clifton Forge, Va., died on September 12. Mr. Langton was born on April 13, 1872, at Hannibal, Mo. After serving an apprenticeship as a machinist on the Chicago, Burlington & Quincy, he worked as machinist, enginehouse foreman, general foreman and engineer on various roads, and later served as master mechanic on the Sierra Railway of California, the Kansas City Southern, and the Texas & Pacific. He was at one time superintendent of shops and master mechanic on the Seaboard Air Line, and also held the same positions on the Virginian. Mr. Langton came to the Chesapeake & Ohio early in 1923, as mechanical inspector, and was appointed general master mechanic on February 1, 1924.

WILLIAM T. KUHN, superintendent motive power of the Toronto, Hamilton & Buffalo, died suddenly from a heart attack at his home in Hamilton, Ont., on September 26. He was born at East Radford, Va., in 1872, and, after attending public schools, he completed his education with a mechanical course at a correspondence school in Scranton, Pa. Mr. Kuhn entered railway service with the Norfolk & Western, in 1888, as a machinist apprentice, and served consecutively to 1900, as machinist, enginehouse foreman, and assistant air-brake instructor. In 1900 he entered the service of the Lake Shore & Michigan Southern (now part of the N.Y.C.) as enginehouse foreman and mechanical inspector, and continued with that road until March, 1911 when he undertook the position of assistant master mechanic of the Lake Erie & Western (now part of the New York, Chicago & St. Louis). He became connected with the Toronto, Hamilton & Buffalo on October 16, 1911, as master mechanic, and on June 1, 1914, was advanced to the position of superintendent motive power.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers. State the name and number of the bulletin or catalog desired, when mentioned in the description.

PORTABLE SPRAY-PAINTING OUTFITS.—Catalog PC, giving concise information and prices on DeVilbiss portable spray-painting outfits, has been published by the DeVilbiss Company, Toledo, Ohio.

INDIVIDUAL MOTOR DRIVES.—A wide range of belt-driven machine tools and other machinery that may be modernized by individual motor drives is illustrated and described in the catalog issued by the Hertzler & Zook Company, Belleville, Pa.

CARNEGIE WHEELS.—The catalog entitled "Carnegie Rim-Toughened Wrought-Steel Wheels," issued by the Carnegie Steel Company, Pittsburgh, Pa., compares the grain structure of treated and untreated wheels, describes scleroscope and Brinell tests, and illustrates the rim-toughening machine and treating furnace.

PIPE TOOLS.—The new No. 32 condensed catalog issued by the Borden Company, Warren, Ohio, lists nine recently added tools and describes outstanding improvements in early models of the Beaver line of pipe tools which are made in various types and a range of sizes from ⅛ in. to 12. in.

ELECTRIC MELTING POTS.—Trent electric melting pots and other electrically heated industrial equipment are illustrated and described in the eight-page bulletin issued by the Harold E. Trent Company, 618 North Fifty-fourth street, Philadelphia, Pa.

LATHES.—The new model Series "O" lathes are illustrated and described in catalog No. 92 issued by the South Bend Lathes Works, 425 East Madison street, South Bend, Ind., which company is now celebrating its twenty-fifth anniversary. A number of practical attachments adapt these Series "O" lathes, of which there are ninety-six sizes and types, to special operations that would otherwise require the purchase of single-purpose lathes.

DRAFT GEAR PRODUCTION.—A 24-page booklet entitled "Miner Draft Gear Production" has been recently published by W. H. Miner, Inc., the Rookery, Chicago. This booklet, generously illustrated, gives an excellent general idea of most of the important operations in the manufacture of Miner friction draft gears from the selection of pig iron and scrap in the storage yards to casting the cylinders and friction elements, manufacturing and testing springs and assembling the complete gears. This booklet is of more than ordinary interest because it shows how thoroughly scientific research has been co-ordinated with service performance and experience covering a 37-year period to produce the friction draft gears made by this well-known company.